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The overhead projector was designed to fill a recognized need in visual communication. It is a transparent, still projector capable of enlarging up to 10"x 10" transparencies. By locating the projector at the front of the classroom its use may be multiplied. The size of the material can be easily and quickly changed, shapes can be presented and compared, exposure can be controlled, and color can be included as needed. Overhead projection works particularly well with illustrated lectures and developmental presentation. Due to its flexibility of use, its brilliant image, and its convenience, the overhead has achieved a prominent place in communication tools.

The use of the projector in demonstrations, dramatizations, group discussions, illustrated lectures, evaluations and in conjunction with blackboard and flannelboard lessons is explained. Special instructional methods are discussed, including the overlay, the cellophane roll, the hidden, and the animation techniques. These can be adapted to elementary, secondary, and college teaching. A chapter is devoted to the creation of images by blocking, coloring, and polarizing the light and to the making of transparencies by application, transfer, and polarized technimation. Numerous illustrations accompany the text.

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INSTRUCTIONAL TECHNOLOGY - U.S.C.

Overhead Projection

Horace Clay Hartsell, Ph. D.
and Wilfred L. Veenendaal, M. S.

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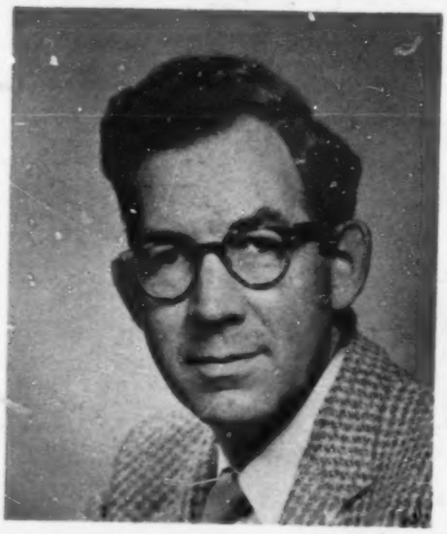
Horace Clay Hartsell was born in Magnolia, Arkansas, on March 10, 1918. He attended the public schools of Teague, Texas, and received his Bachelor of Science Degree from San Houston State Teachers College at Huntsville, Texas, in 1942. In 1949, he received the degree of Master of Education from the University of Texas, Austin, Texas. He received the Doctor of Education from the University of Texas in 1951. He was employed as a classroom teacher in the public schools of Texas for seven years. Then in February, 1950, he joined the faculty of the University of Texas as a teaching fellow in Educational Psychology and Audio-Visual Education and later served as a lecturer. In 1951, he joined the faculty of Texas Technological College as assistant professor of education. He joined the staff of Michigan State University as Audio-Visual Consultant to the Highway Traffic Safety Center and associate professor of education in June, 1954. He is now Associate Director of the Audio-Visual Center.



Wilfred L. Veenendaal, Head, Graphics Section of the Audio-Visual Center, Michigan State University, since 1954; Instructor in Arts and Crafts, Central High School, Sheboygan, Wisconsin, 1937-43, 1946-54, and special instructor in the adult and playground programs of the Recreation Department of that city; noncommissioned officer in the Information and Education Section, U.S. Army, and instructor in the Army's University of Okinawa, 1943-46; Instructor in summer laboratory school, University of Wisconsin, 1948. Bachelor of Education degree, Wisconsin State College, Milwaukee, Wisconsin, 1937; Master of Science in Art Education, University of Wisconsin, 1947; past-president of the Sheboygan Education Assoc., President of Wisconsin Art Education Association, 1951; Winner of several awards in artistic competition. Member Wisconsin Painters and Sculptors, Kappa Delta Pi, Phi Delta Kappa educational fraternities. Author of numerous articles in art education, audio-visual journals.

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overhead projection

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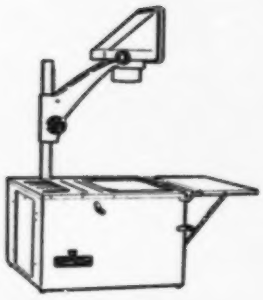
overhead



projection

by Horace C. Hartsell Ph.D.
Associate Professor and Associate Director
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Audio-Visual Center, Michigan State University

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INSTRUCTIONAL TECHNOLOGY - U.S.C.

Preface

The vastly increased emphasis on overhead projection in recent years has brought about a growing need for a book on the subject.

American Optical Company was acutely aware of this need. It was a perfectly logical step, then, for American Optical, a major manufacturer of overhead projectors, to ask Dr. Horace C. Hartsell and Mr. Wilfred L. Veenendaal, acknowledged experts on the subject, to collaborate on such a book.

Original plans called for a rather modest 48 page booklet on the practical applications of the overhead in the classroom. However, the authors' boundless enthusiasm for the overhead projector as a teaching aid and their comprehensive knowledge of the subject soon made such a restrictive format completely inadequate. The manuscript and illustrations they submitted were so perfectly integrated and the whole so completely organic that not a word could be edited, not an illustration deleted. OVERHEAD PROJECTION is virtually a definitive text.

American Optical and the authors hope sincerely that this book will prove a valuable supplement to your good teaching efforts by providing new ideas and fresh incentive for the creative use of the overhead projector.

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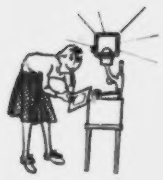

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the overhead projector

CHAPTER

1

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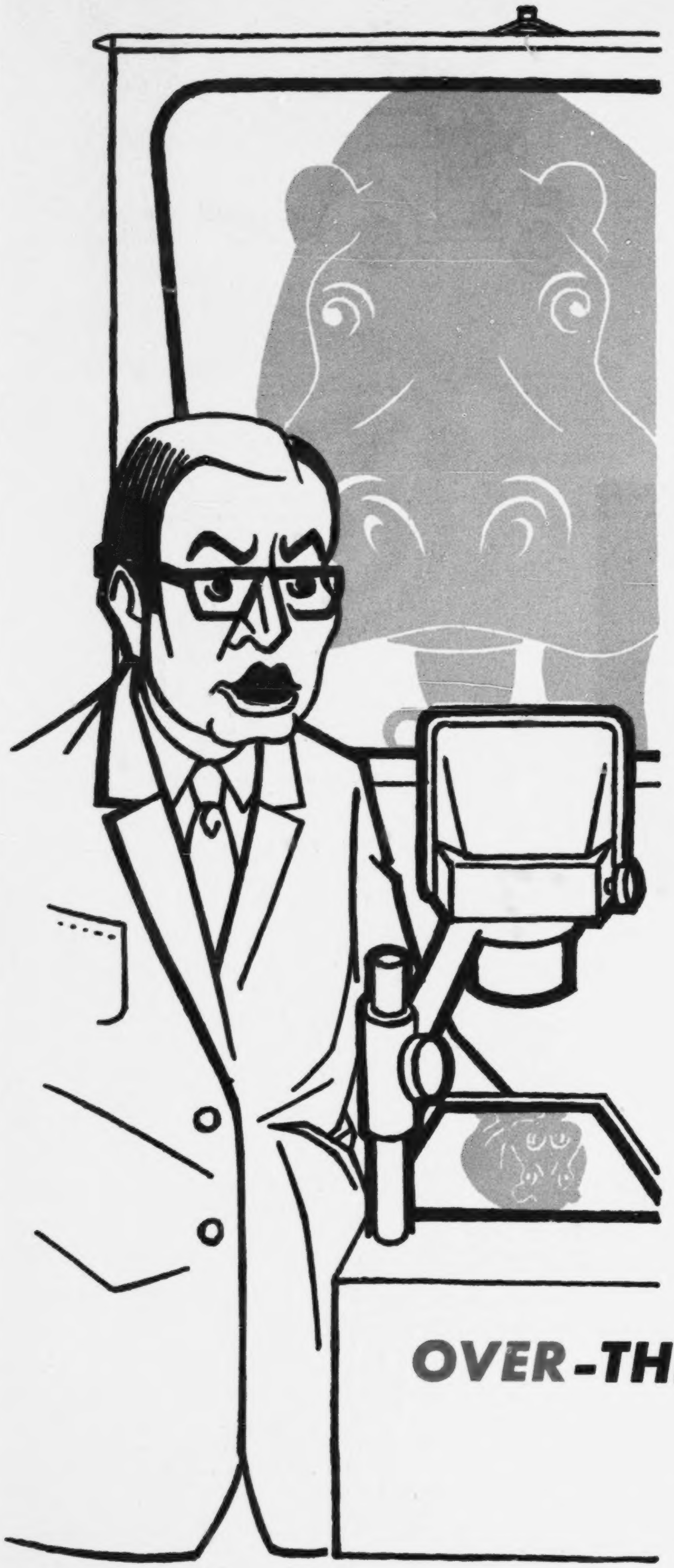
Excitement, enthusiasm and much "drum beating" generally accompanies the announcement of a new and different communication device. Many claims are made and much effort is expended to discover paths of usefulness.

The overhead projector was different. It made its entrance with less fanfare because it was conceived and developed to fill a recognized need in visual communication.

To clarify what is meant by overhead projection, a brief discussion will be given as to (1) what it is, (2) how it can be used, (3) why is was developed, (4) how it is different and (5) how its materials are obtained.

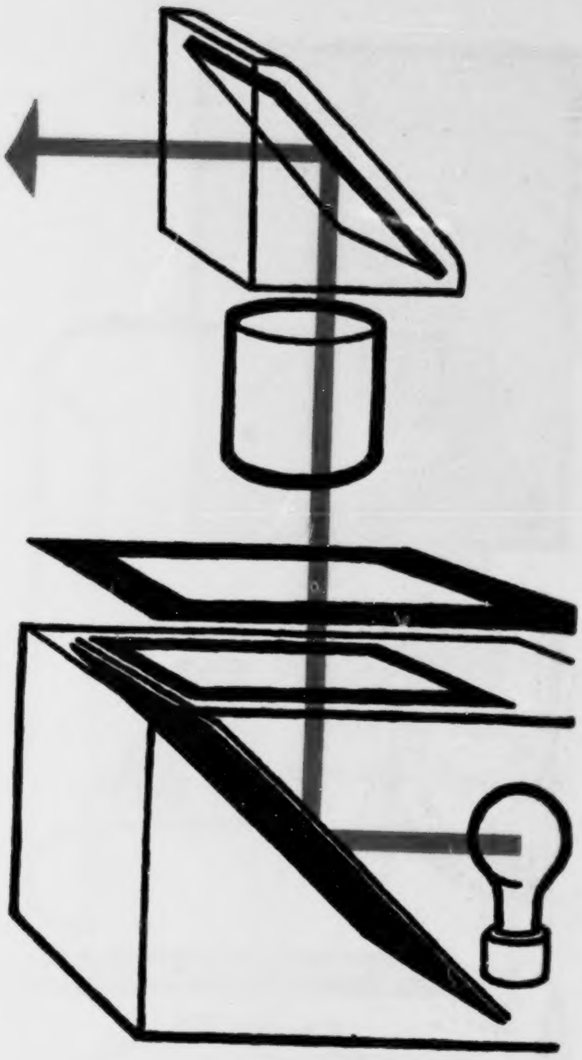
What It Is

The overhead projector is a transparent still projector capable of enlarging up to 10" x 10" transparencies with brilliant screen images suitable for use in a lighted room. Its optical arrangement permits transparent graphics to be placed over a lighted platform for quick reference and for "over-the-shoulder" projection. Its light pattern moves vertically through the transparency to an overhead mirror mounted at a 45 degree angle above the objective lens. The overhead mirror turns the rays of light so that they strike the screen perpendicularly.

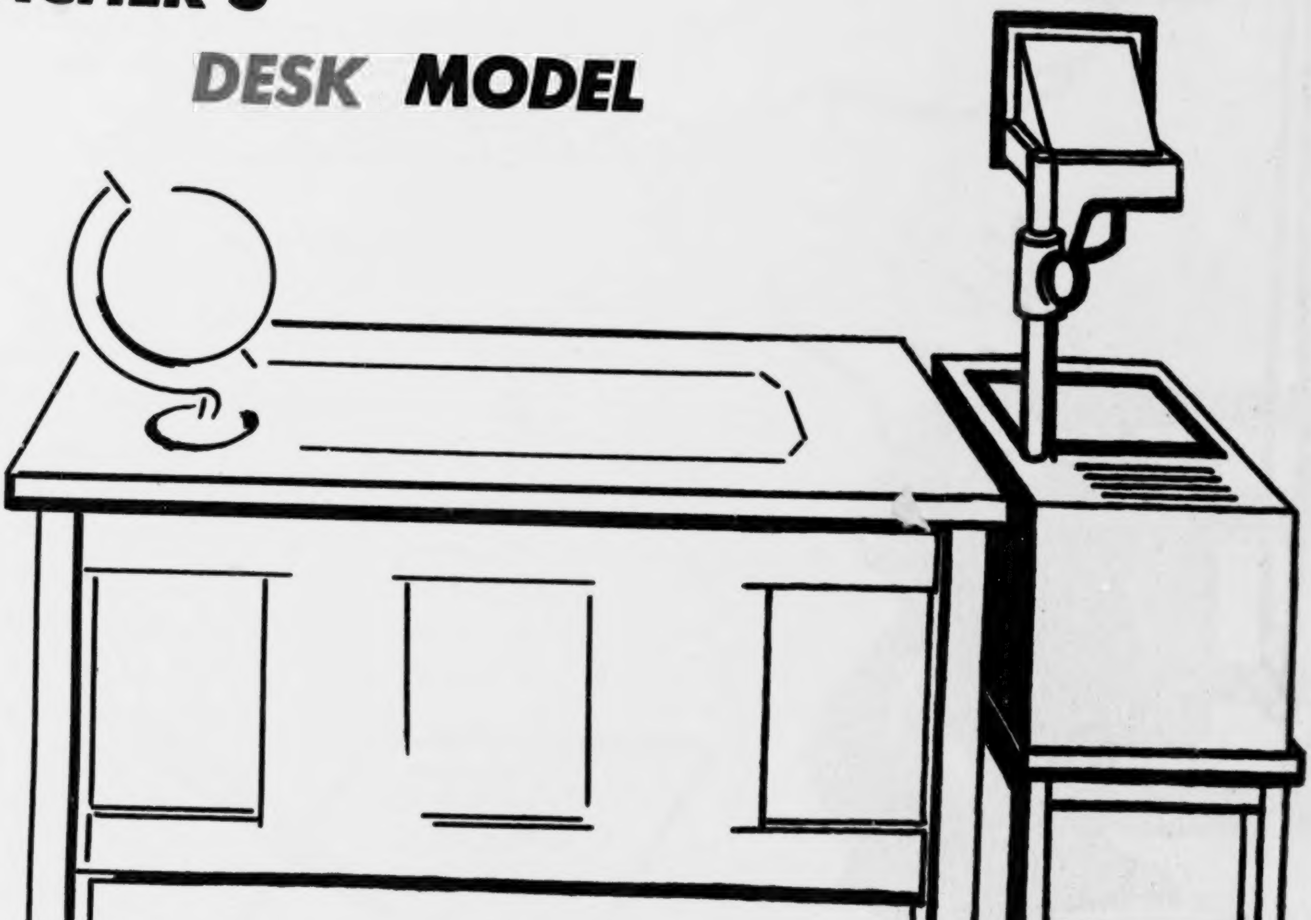


OVER-THE-SHOULDER

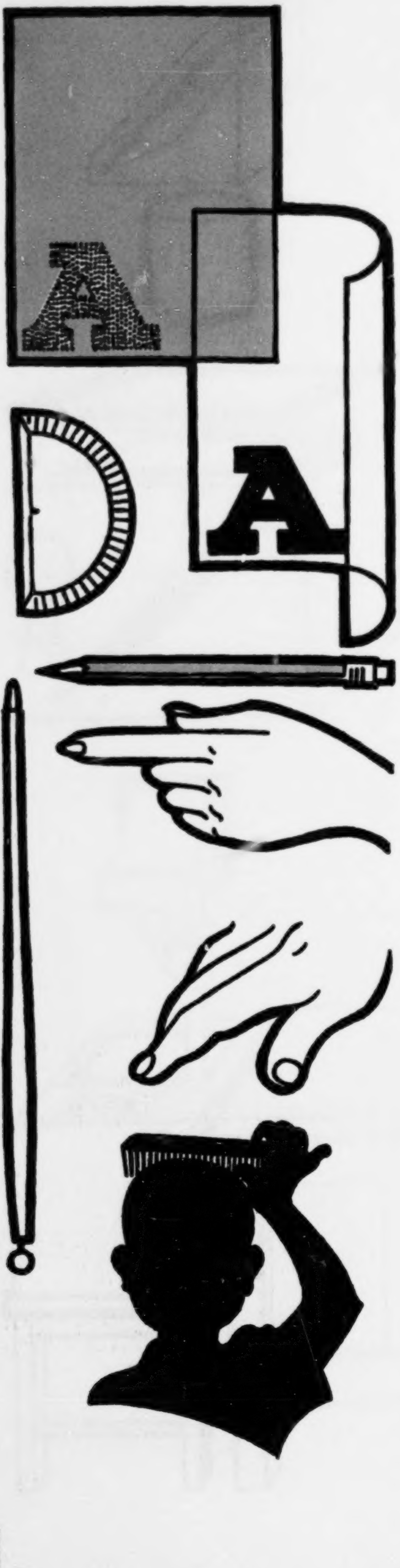
Frequently the overhead projector is referred to as the "teacher's desk model" because it is used by, or near the teacher's desk at the front of the room. This location permits the teacher to be the projectionist while facing the students. A short focal-length objective lens permits a close proximity of projector and screen and at the same time provides the enlargement of materials necessary for adequate viewing.



TEACHER'S DESK MODEL

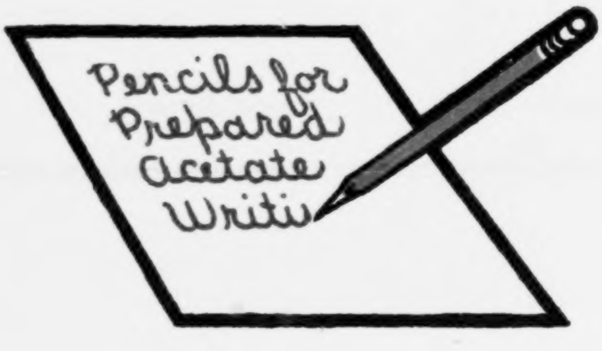


MATERIALS



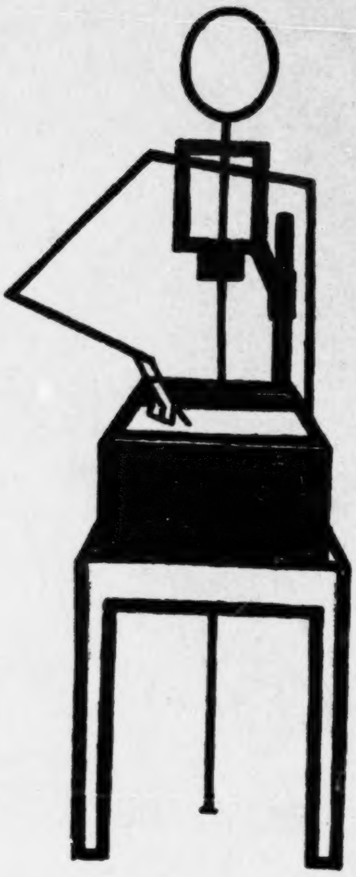
Materials for the overhead projector include transparent color and clear plastic or acetate sheets, transparent liquids, silhouettes, and small objects. Shadow movement from pencils, fingers and hands may point direction; markings, with appropriate pencils, on transparent surfaces, extra sheets of cellophane, plastic frosted sheets, carbon sheets, or plastic and cellophane rolls may emphasize significant information. Or manipulating special transparent sheets containing photographs or drawings, hinged together, may assist in psychologically-timed visual presentations.

The overhead projector is truly a new communication tool for placing graphic materials at the finger-tips of the teacher. As has been found with other projectors, its use tends to eliminate certain learning barriers and to unify a group in studying a planned learning problem. It stimulates creative teaching and increases student participation. Its communication value is limited only by the resourcefulness of its user.



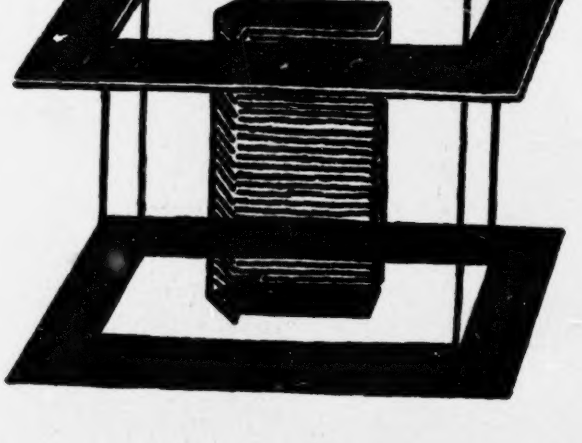
How It Can Be Used

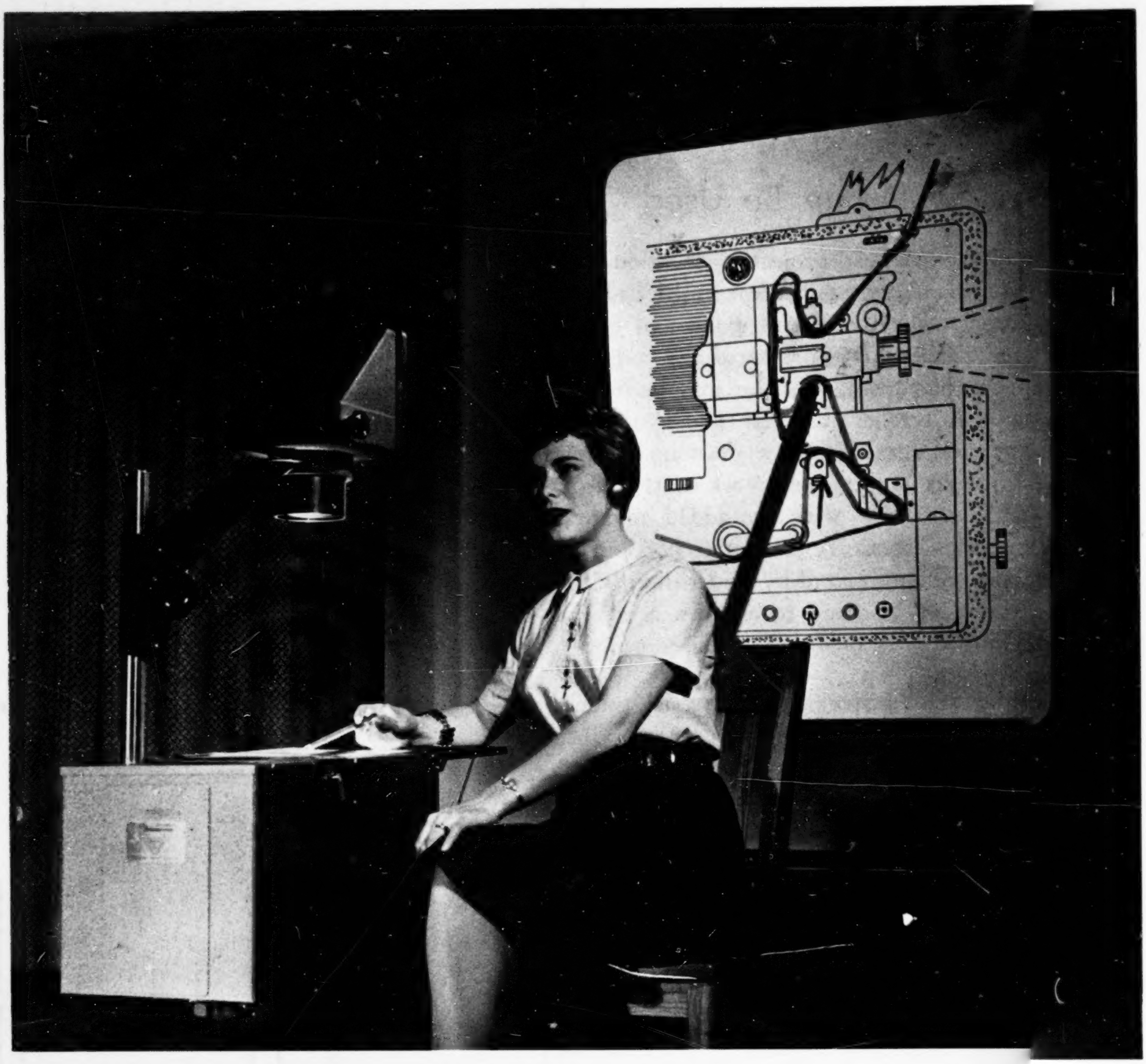
Due to the overhead projector's location at the front of the room, its uses become multiplied. The size of projected material can easily and quickly be changed; shapes can be presented and compared; exposure can be controlled; color may be included as needed. A teacher may use plastic sheets or cellophane rolls for writing or drawing in much the same manner as she would work on the surface of a chalk board, but with the added advantage of facing the viewers. A particular portion of a graphic may be emphasized by underlining, drawing, marking, or pointing to a given area. This action is immediately recorded on the screen.



Much graphic instructional material, such as charts, maps, graphs, or posters can be reproduced on 10" x 10" transparencies to simplify the problem of storage and care. Graphics in transparency form offer the added advantage of enlargement to meet the visual needs of the audience. Such flexibility is of decided advantage to the back seat viewer. Surface markings, frequently needed but seldom possible with conventional materials, may be made without damaging the original graphic.

Overhead projection works particularly well with illustrated lectures and developmental presentations. Prearragement of materials permits a lecturer to expose each at the psychological moment to obtain maximum audience response. In a developmental presentation, each component part may be presented as the teacher senses an audience's "state of readiness" for the next step. Overhead transparencies become visual notes for a lecturer as well as an outline guide to the observer. Marginal notes may be carried on the mounting of the transparency without being exposed to the audience.





Directions for students can be quickly given by neans of descriptive paragraphs, outlines and references. Prepare student exercises are time-savers in getting and directing attenti n to the planned experience. Student concepts may be tested b student performances at the overhead projector while other assmates observe. Relationships may be shown and values com ared by means of transparent overlays produced in contrasti colors, shapes and forms to be superimposed one over the oth r.

The overhead projector can become a useful chang of pace device in the presentation of ideas and information. t can be used in conjunction with a flannel board or a chalk boa . It can

also be employed as a basic tool to clarify aspects of a demonstration. Overhead materials may serve (1) as a discussion guide in the follow-up of an educational film, (2) as a recording device for visually presenting minutes in a business meeting, or (3) as a recording of similarities, differences and significant points in panel and symposium.

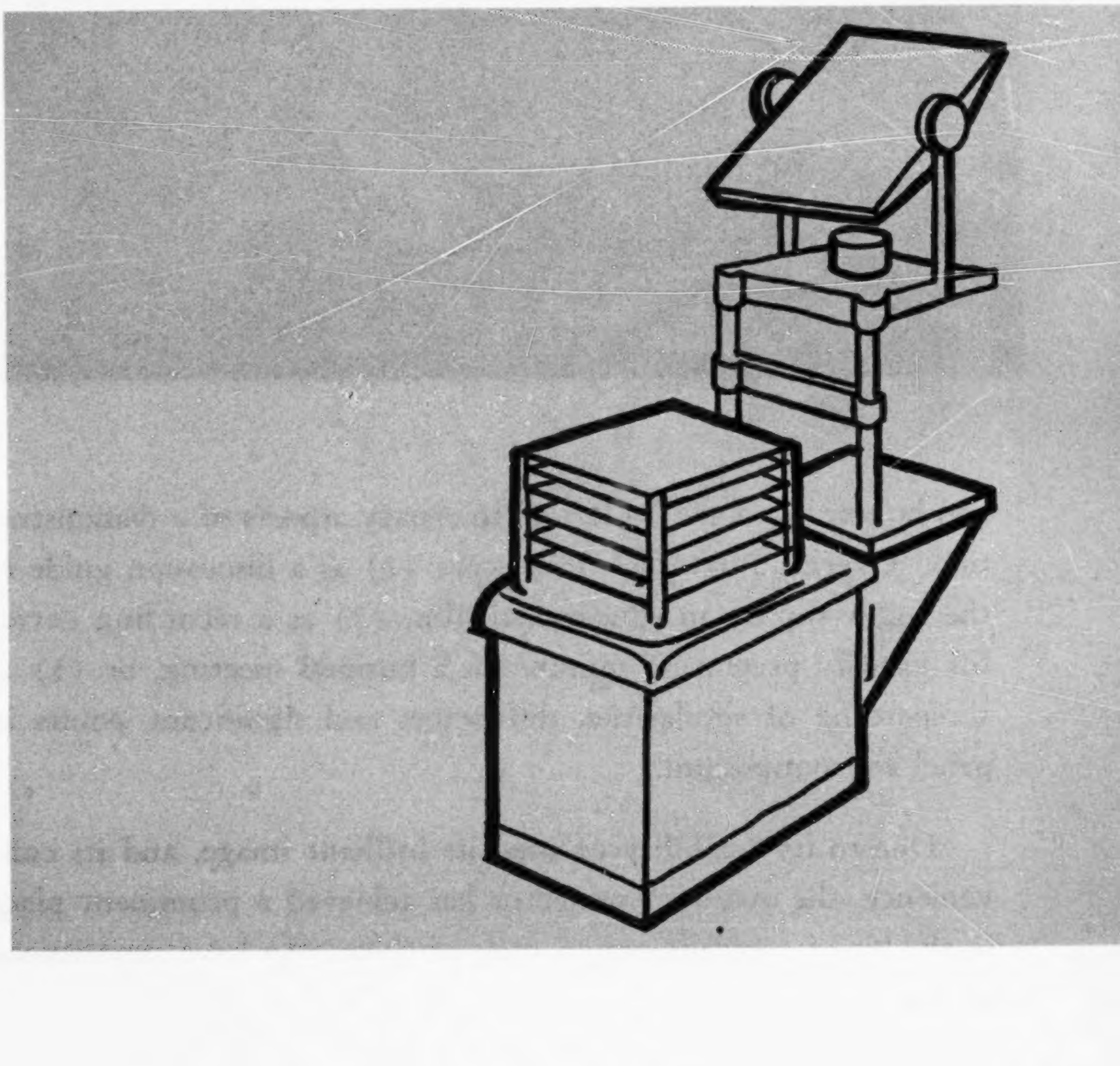
Due to its flexibility of uses, its brilliant image, and its convenience, the overhead projector has achieved a prominent place in the kit of communication tools of those who have experienced its use.

OVERHEAD
PROJECTOR
WHAT?
HOW
WHY
DIFFER?
MATERIAL
TYPES?

Why It Was Developed

By nature of design, other still projection devices separate the teacher from the group. Their use generally requires the projector to be located at the rear of the room, thus detaching the teacher from the group as a projectionist. If the teacher serves as the projectionist for these tools, he may find himself at a psychological disadvantage as he directs his remarks to the backs of the students.

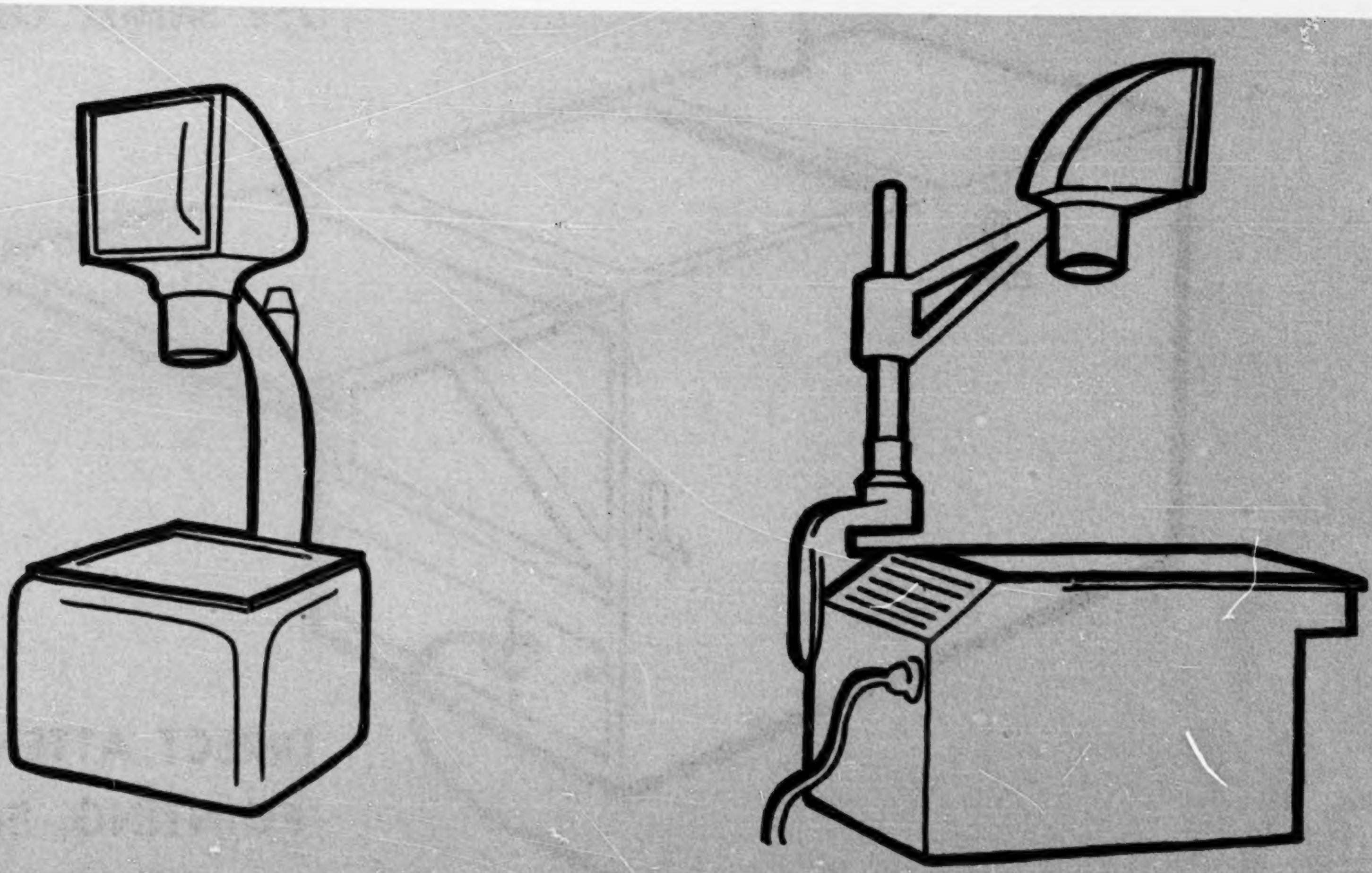
The Armed Forces, recognizing these disadvantages, encouraged perfecting an instrument that would allow the instructor to project from the front of the room while facing his class. The overhead projector was developed to be used with transparencies lying flat on a lighted surface and in reading position. In addition, the overhead projector provided for the first time,

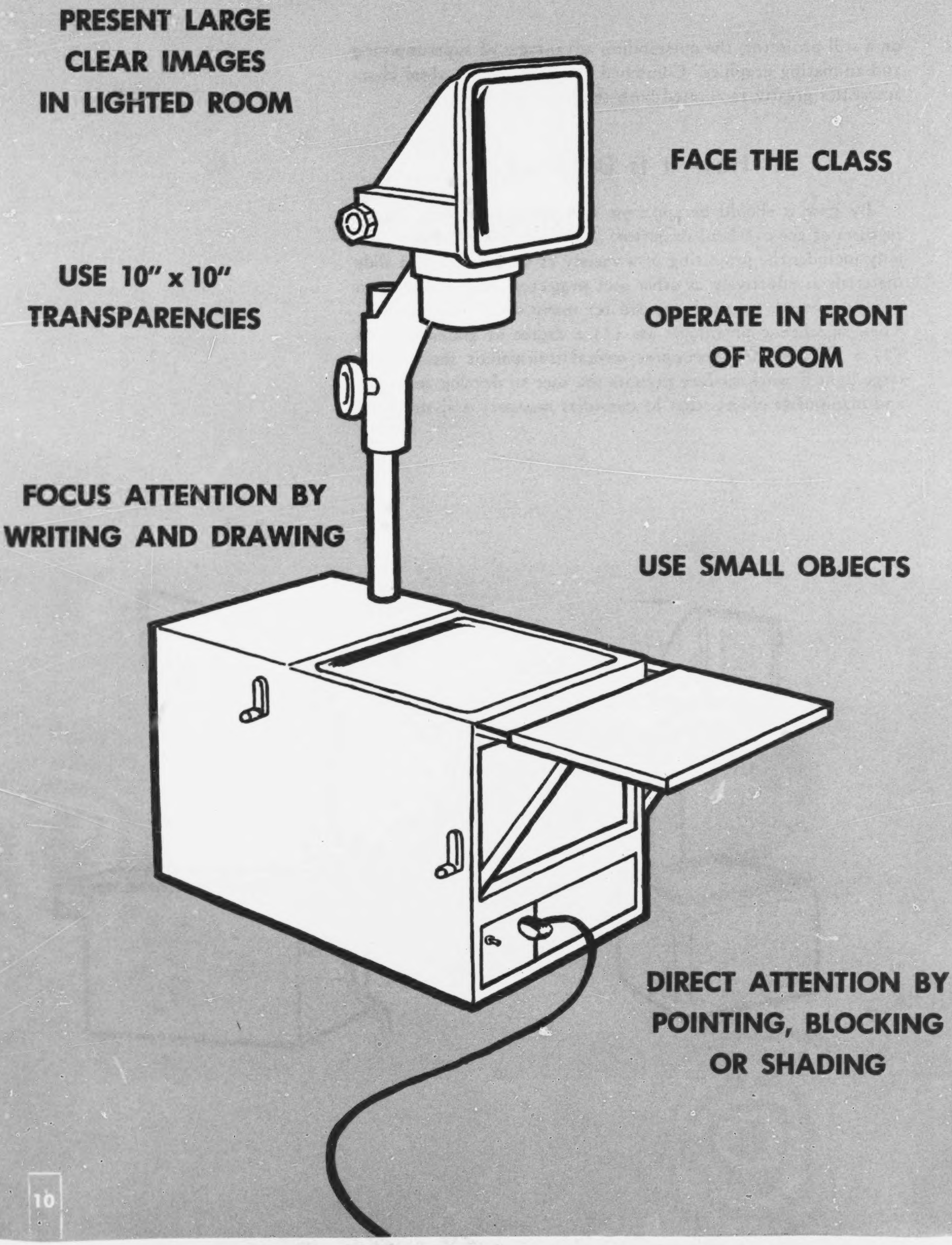


on a still projector, the outstanding advantages of superimposing and animating graphics. Combined in one projector, these characteristics greatly facilitated both teaching and learning.

How It Is Different

By now it should be apparent that there are many unique features of the overhead projector. Its projection capability, not only includes the projecting of a variety of still transparent slide materials as effectively as other still projectors, but it adds two unique processes so vitally needed for many visual presentations. These significant advantages are (1) a degree of animation and (2) a capacity to superimpose several transparent sheets. The large lighted work surface permits the user to develop materials and manipulate objects that he considers necessary and timely.




PRESENT LARGE CLEAR IMAGES IN LIGHTED ROOM
FACE THE CLASS
USE 10" x 10" TRANSPARENCIES
OPERATE IN FRONT OF ROOM
FOCUS ATTENTION BY WRITING AND DRAWING
USE SMALL OBJECTS
DIRECT ATTENTION BY POINTING, BLOCKING OR SHADING

Use of the overhead projector permits the teacher to do the following:

1. Stay in the front of the room, facing the class.

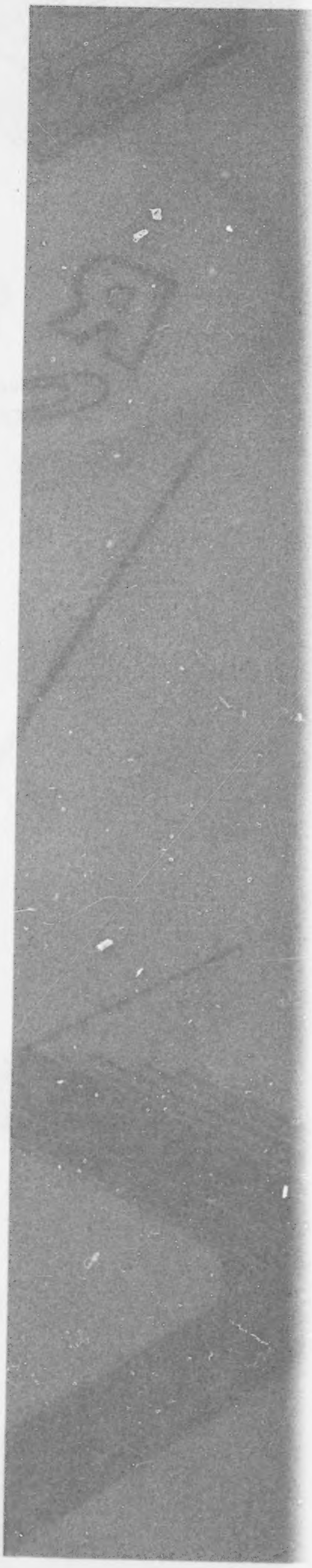
2. Operate the projector and manipulate the materials himself.

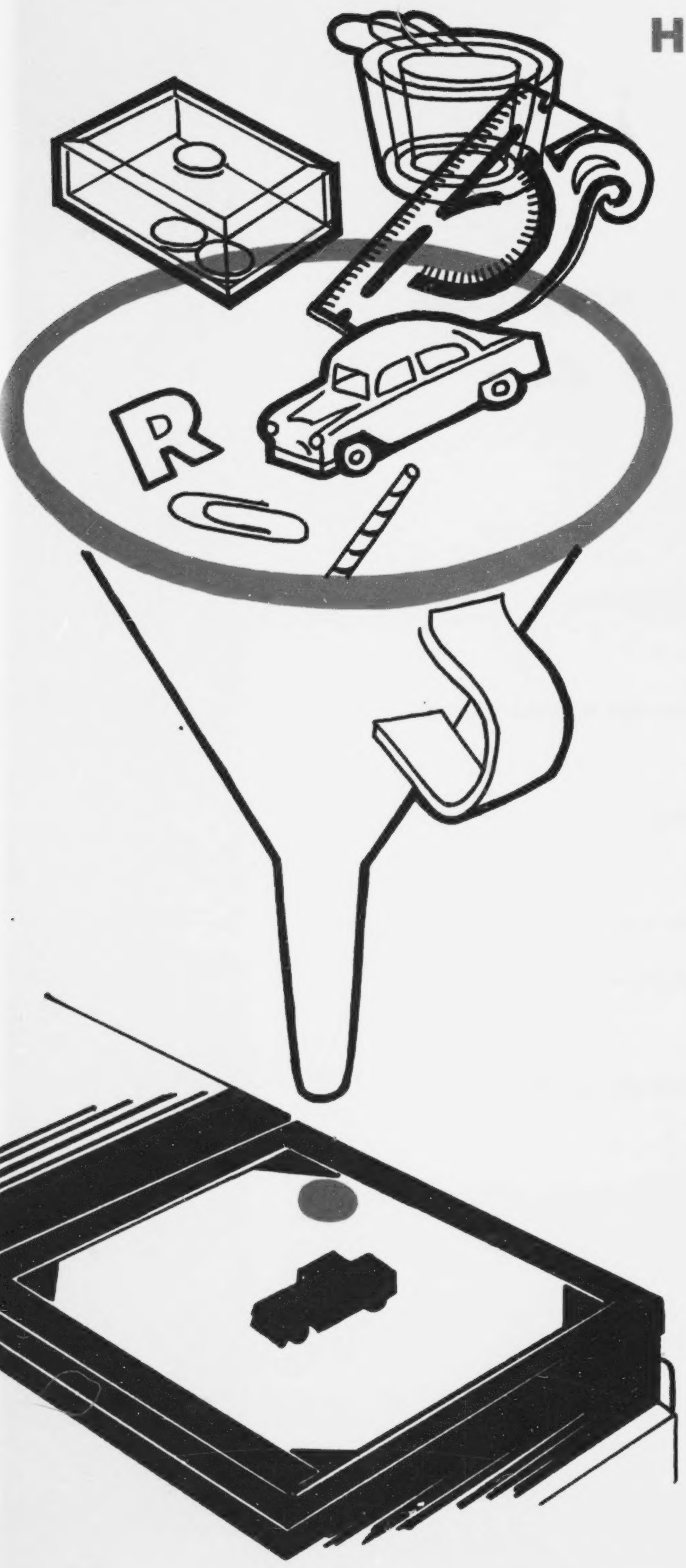
3. Present large, clear images in a lighted room.

4. Use large transparencies (up to 10″ x 10″) on which he can easily write, draw, or otherwise focus attention.

5. Develop a variety of techniques in presenting materials.

6. Direct attention by pointing, blocking or shading emphasis areas on the slide.



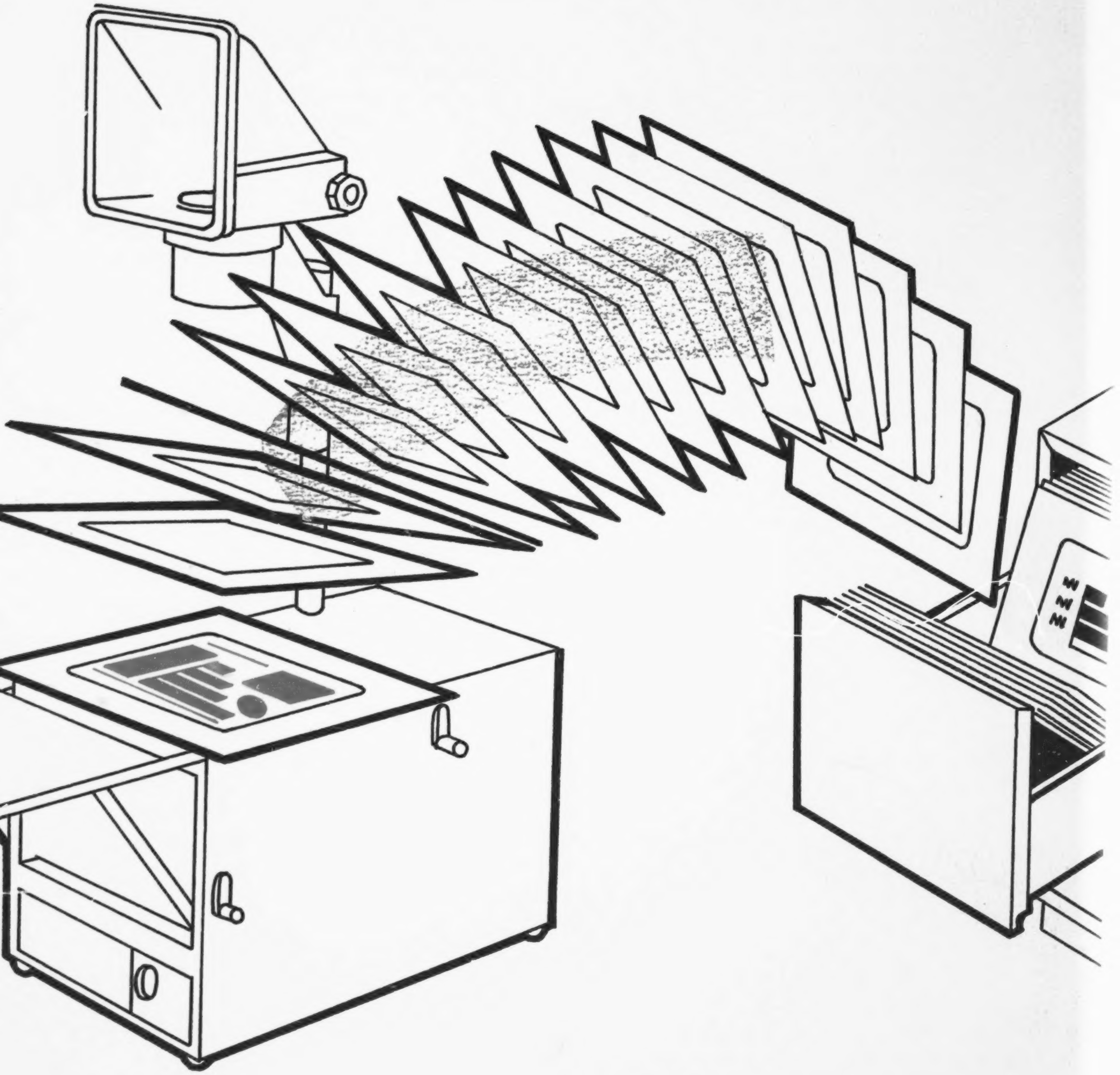


HOW MATERIALS ARE OBTAINED

Many potential users have hesitated to purchase an overhead projector because of a presumed difficulty in getting suitable projection materials. Although it is true that commercially prepared transparencies are currently somewhat limited, this situation can be expected to improve steadily. Of far more importance is the fact that a tremendous amount of valuable material can be developed by individual users. A beginner can, from the start, prepare satisfactory transparencies.

One needs only to enter a 5 & 10¢ store to pick up transparent objects and other materials suitable for projection. Plastic rulers, protractors, measuring cups, colored cellophane, plastic shapes, cardboard and plastic letters and numbers, stamped alphabets, symbols, simple construction sets, small templates, as well as silhouette forms cut from magazines or felt may be put to a variety of uses in overhead visual communication.

To make your own transparencies requires only a little practice and an awareness of a few stock materials. For example, frosted or transparent plastic sheets and special carbons offered by your audio-visual dealer can start you creating needed charts, graphs and typewritten outlines. Direct lifts from books and magazines and tracings and drawings on transluscent paper can easily and quickly be transferred to transparent sheets. There should be no concern about having enough materials to justify the purchase of an overhead projector. Once on hand, its many practical values will become readily apparent. Any teacher can have a storehouse of communication materials that, because of their lasting nature, is immediately ready for use year after year.



A STOREHOUSE OF TEACHING MATERIALS

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the delineascope overhead projector

CHAPTER

2

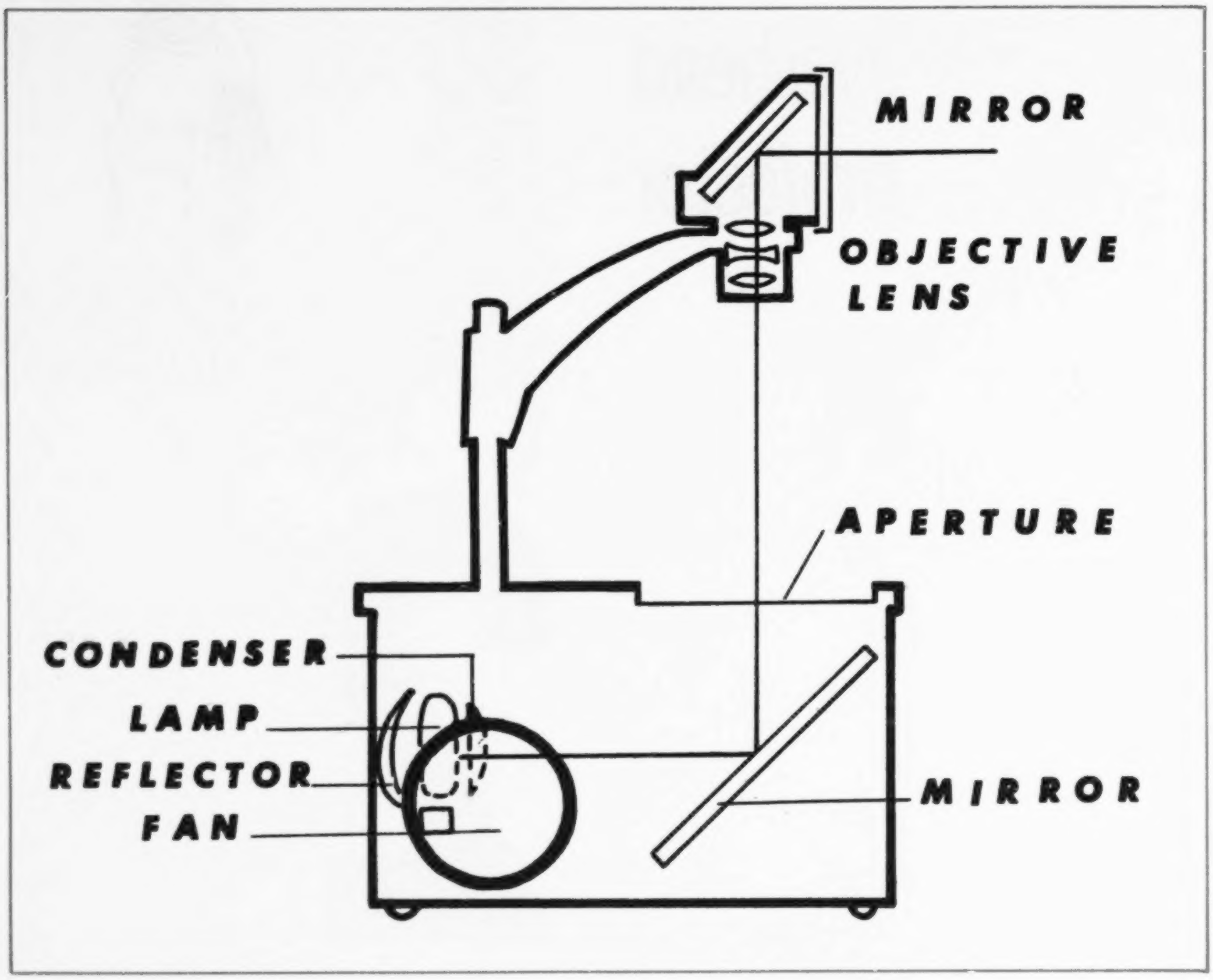
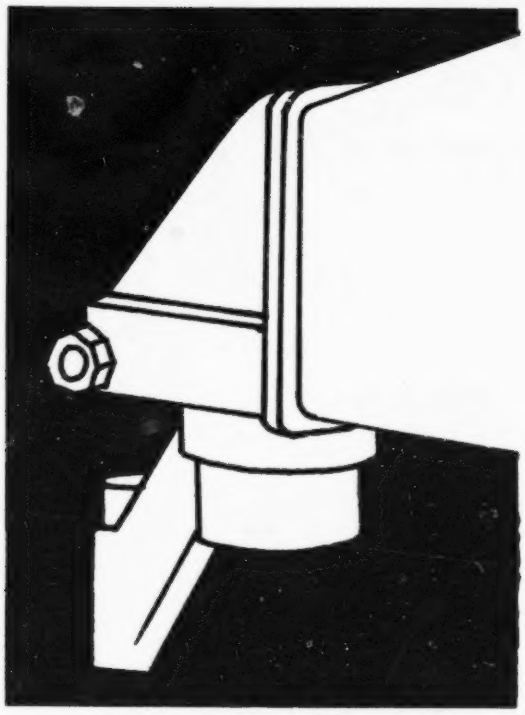

MIRROR
OBJECTIVE LENS
APERTURE
CONDENSER
LAMP
REFLECTOR
FAN
MIRROR

Figure 1

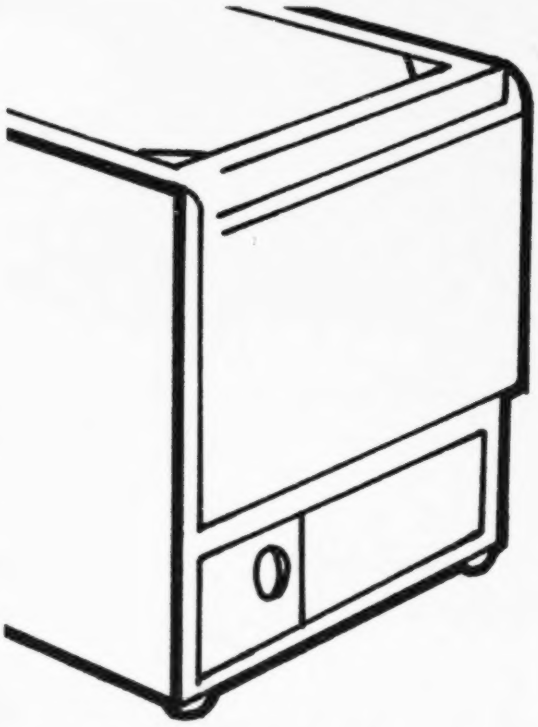
THE DELINEASCOPE OVERHEAD PROJECTOR

Overhead projectors are designed to enlarge transparent and transluscent images by projecting the images on a screen above and behind the head of the projectionist. Parts essential for this task include (1) lamp and reflector, (2) fan, (3) condenser, (4) mirrors, (5) objective lens, and (6) aperture or "openface" platform. The relationship of these parts may be observed in Figure 1.

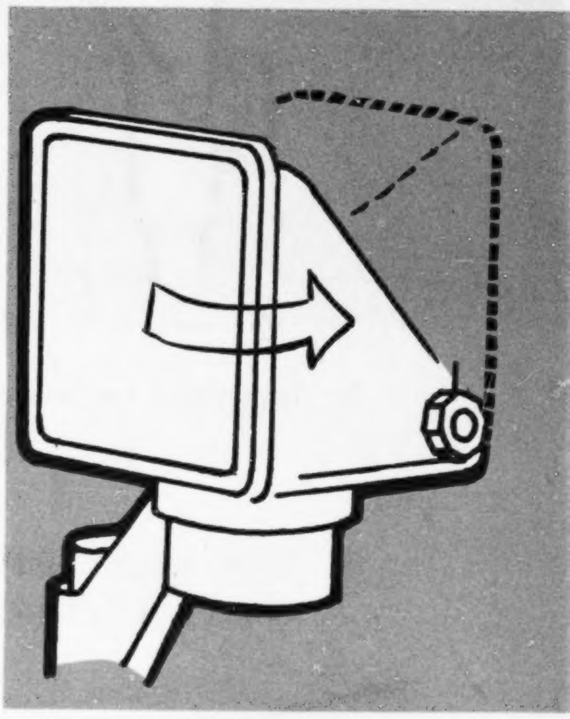
Manufacturers are constantly researching to improve the quality and performance of overhead projectors. The American Optical Company has developed a new overhead projector called the Delineascope that exemplifies new achievement in equipment design. The salient points of the new AO Delineascope Overhead Projector are:



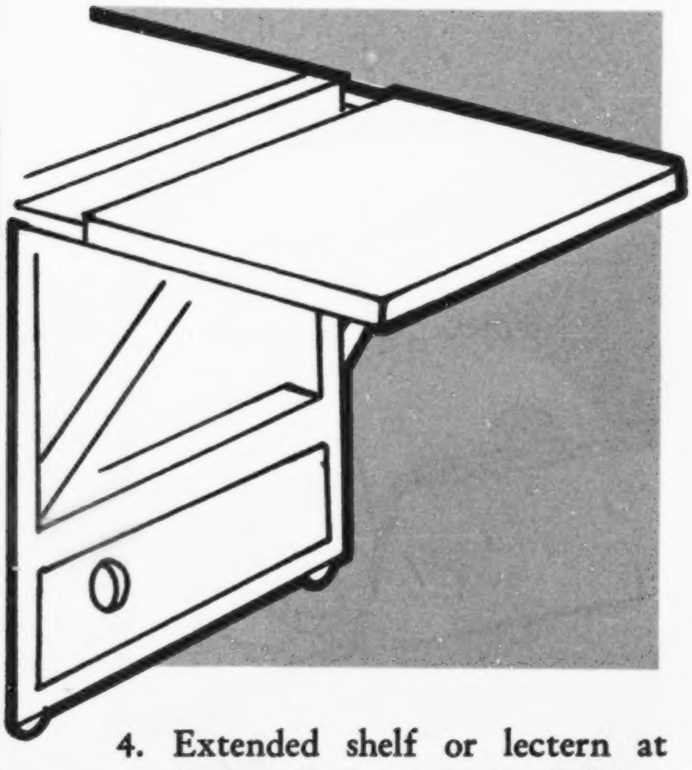
1. Brighter images and more illumination on the screen



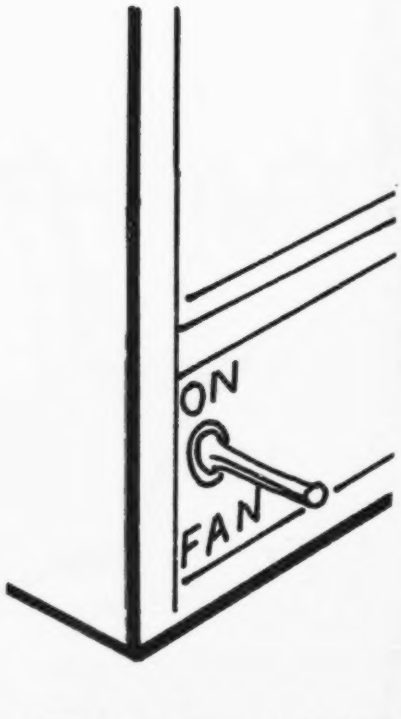
2. Narrow chassis for greater screen visibility



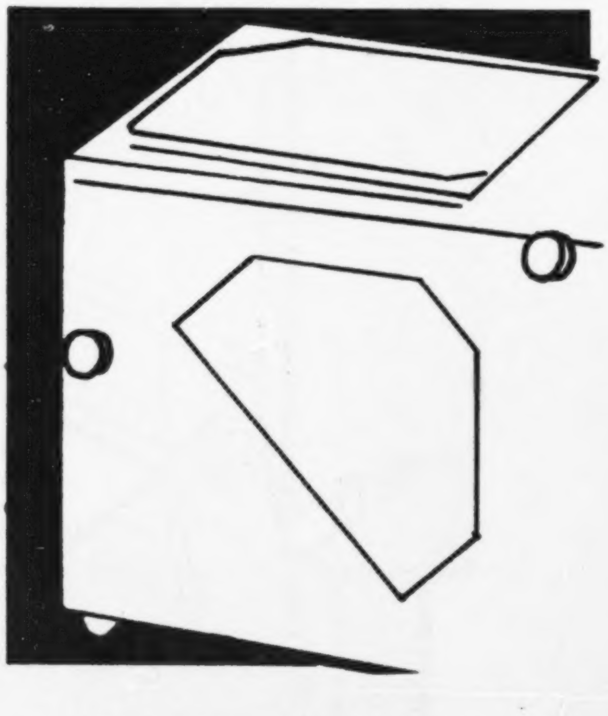
3. Adjustable overhead piece for multi-directional projection



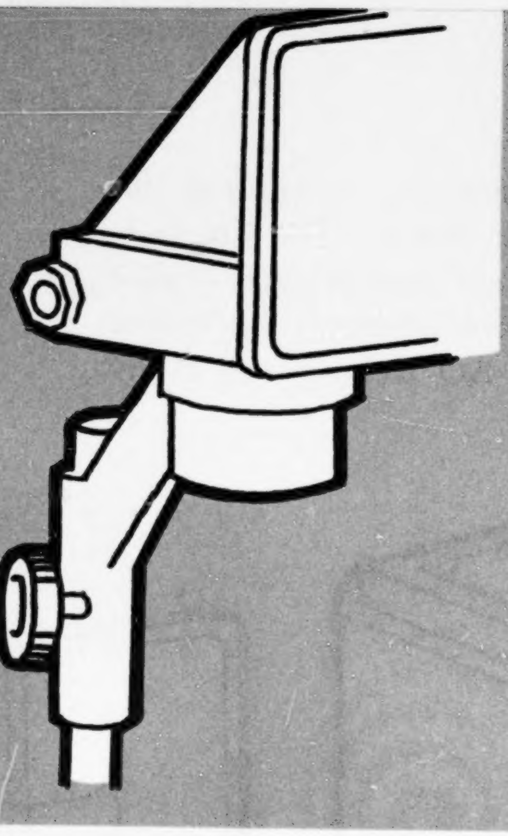
4. Extended shelf or lectern at front of projector for holding unused transparencies

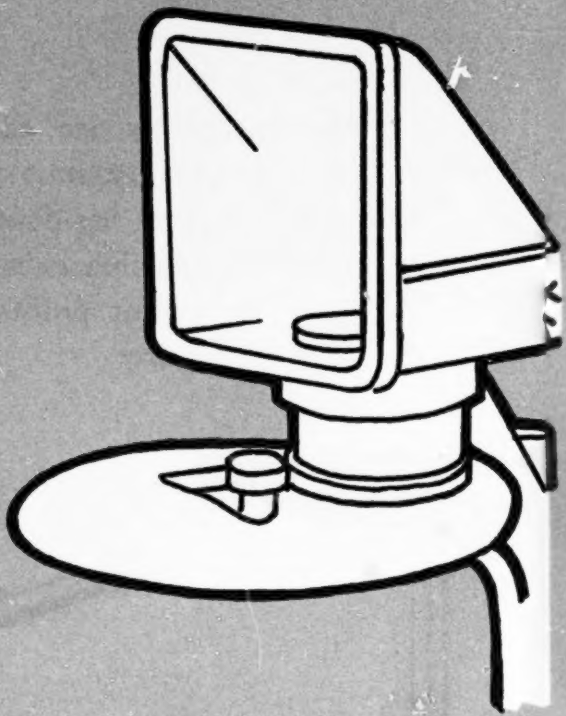


5. Three-way switch for cooling lamp between changing transparencies



6. Mechanism for tightening the acetate roll to prevent wrinkling and crawling while writing or drawing on its surface



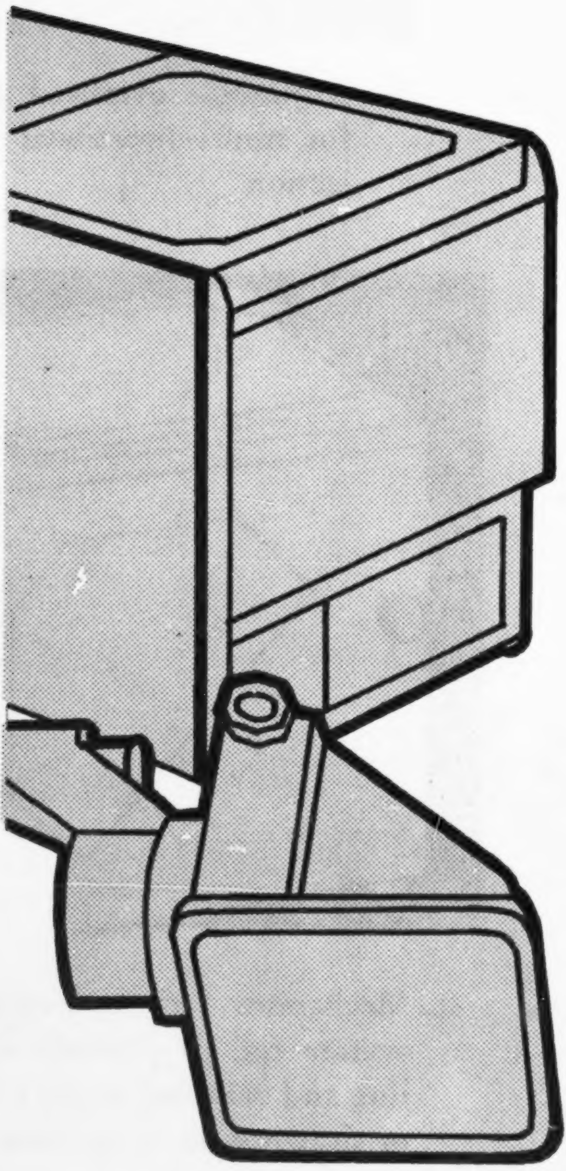


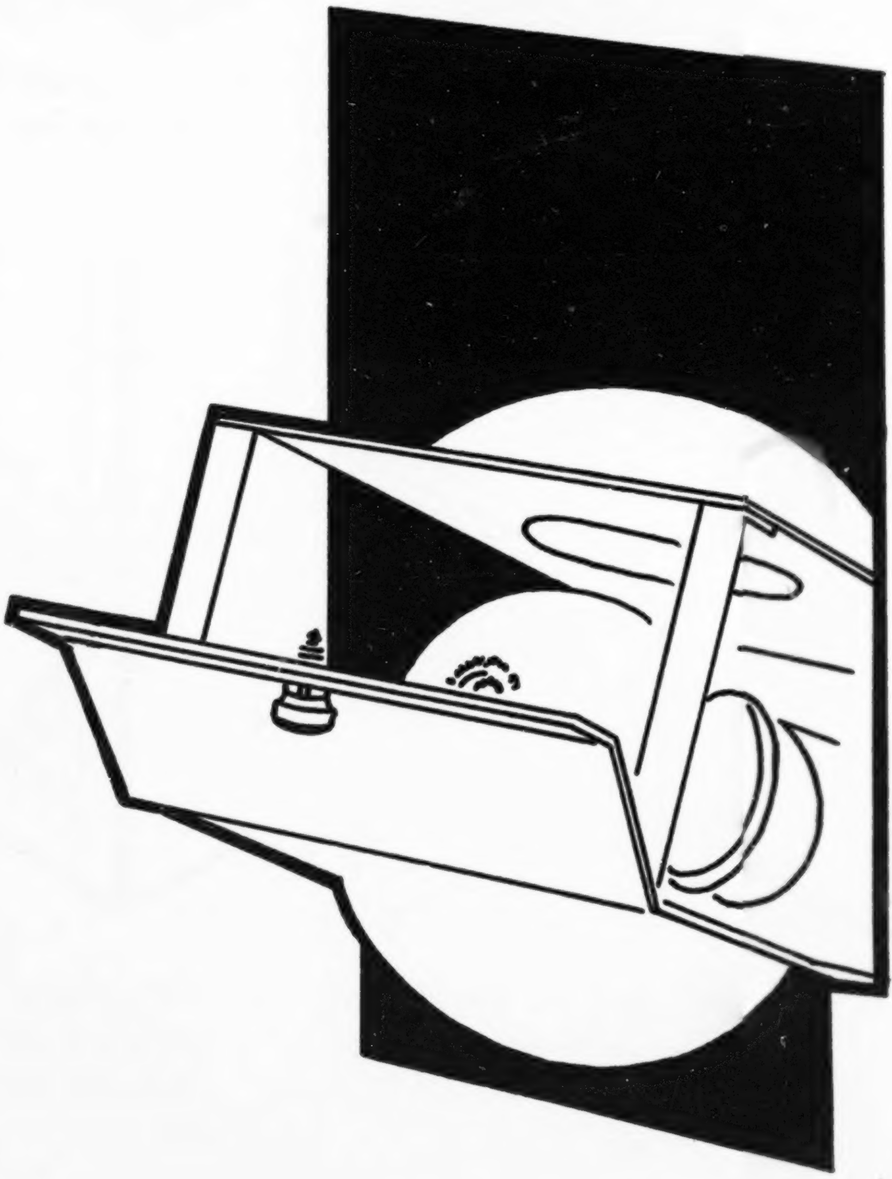
7. Improved focus and elevation controls

8. Light weight and ease in detachment of parts for greater portability

9. Optional technimation spinner and power outlet to add movement to still projection

10. Accessibility to parts for ease in maintenance

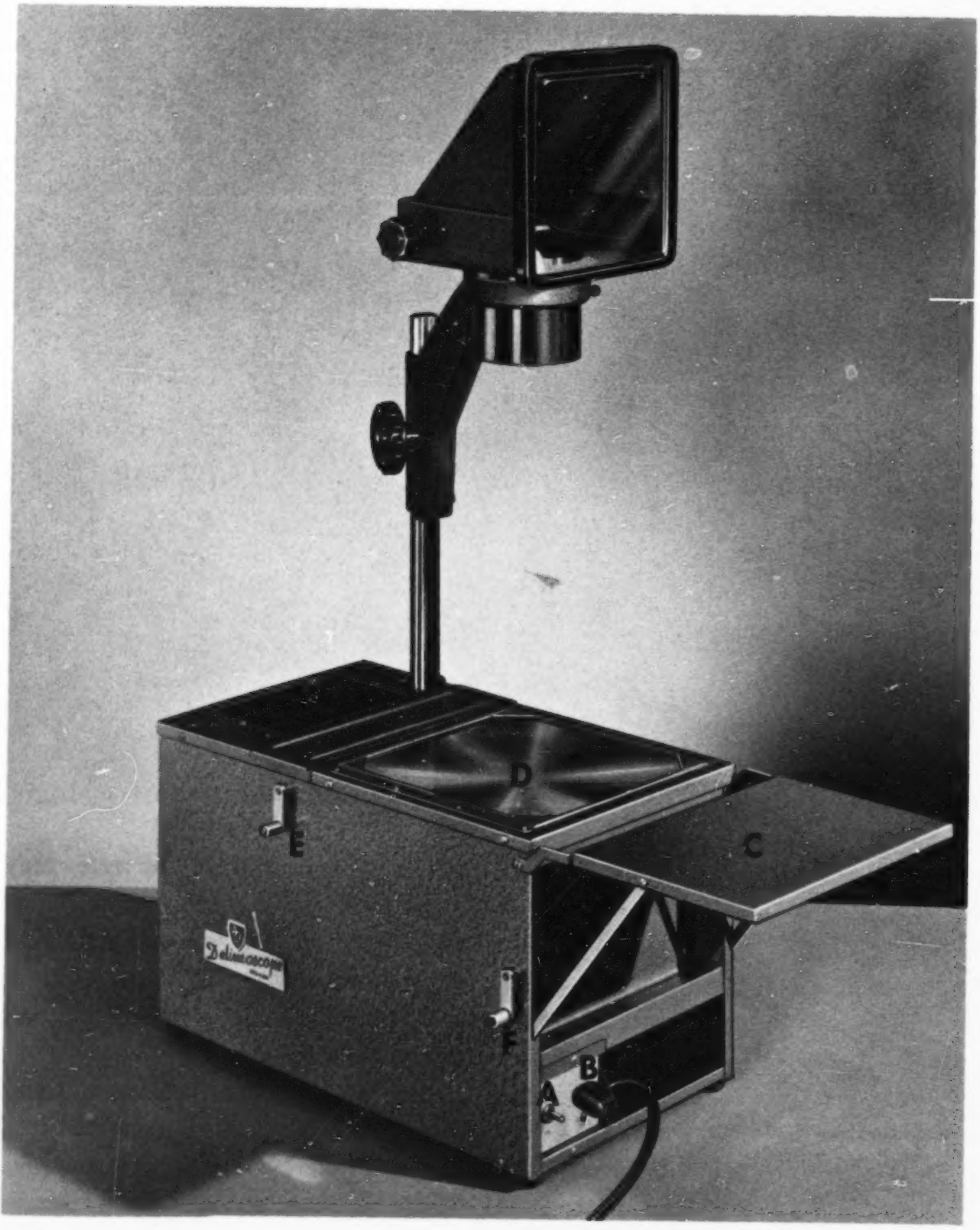




The features of the American Optical Overhead Delineascope may be observed in the front, side and rear views shown in Figures 2, 3 and 4. The narrow chassis and extended front table minimizes obstruction to viewing and increases flexibility for maneuvering materials on the stage. The aperature (size 10″ x 10″) permits ease in use of slip-sheets, acetate roll, transparencies and small objects.

Figure 2 shows the controls in close proximity to the user's position at the left of the projector. The three-way switch "A" and the power cord "B" are exposed when the table "C" is extended. Movement of the acetate roll across the platen "D" is controlled by cranks "E" and "F".

Figure 2



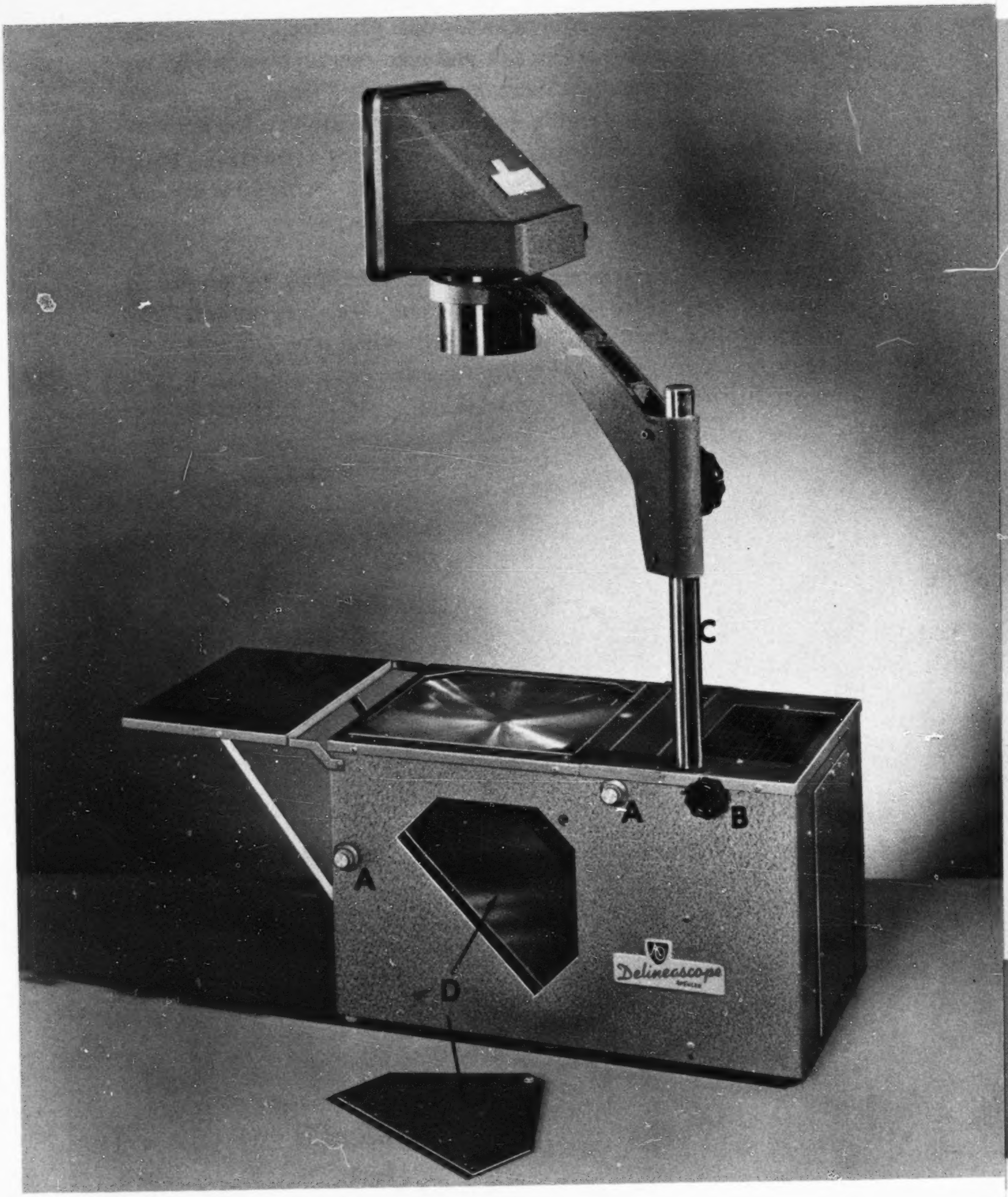


Figure 3

From the side view in Figure 3, one may observe the set locks (A) for tightening the cellophane roll on the stage, the set screw knob (B) for locking the supporting shaft (C) into position, and a service window (D) that permits quick access to the fan and mirror. Figure 4 emphasizes the service entrance (A) to the reflector, lamp and condenser; the focusing knob (B) that adjusts the lens; the elevation knob (C); and the aperture or platen (D) for holding the materials being projected.

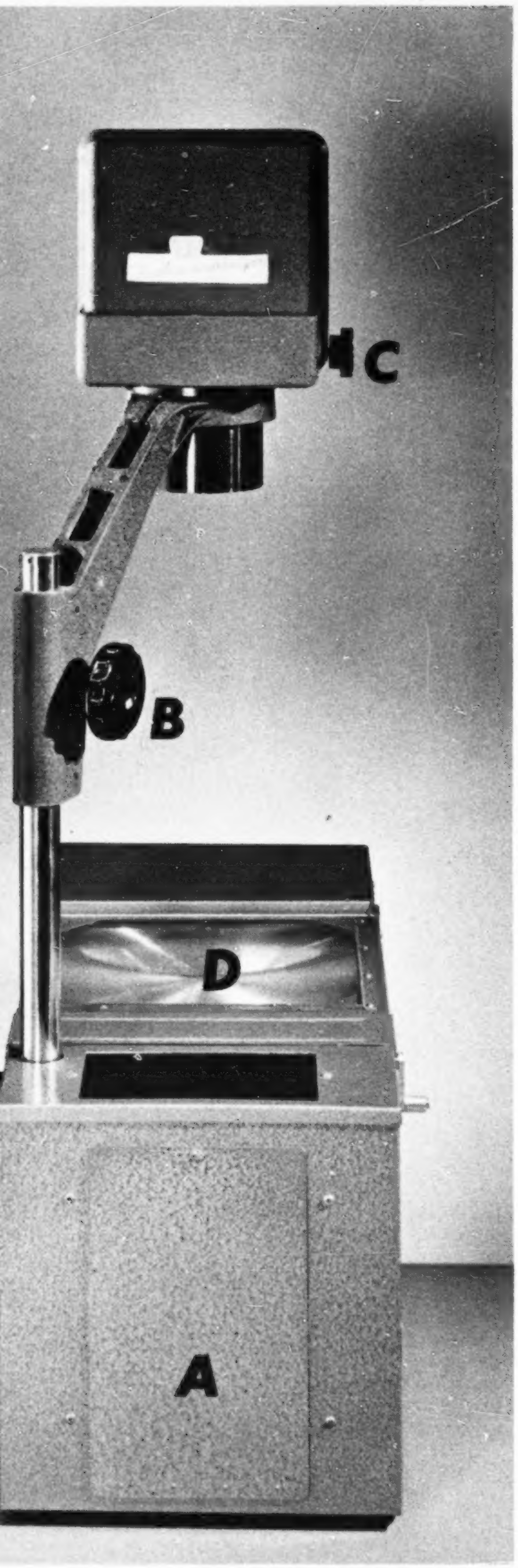


Figure 4

If the overhead delineascope is to be used in a number of rooms within the same building, you may desire to transport it on a rolling stand. However, it is relatively light and can be transported easily by hand.

Schedules frequently require transporting overhead projectors from building to building or from city to city. When such a need arises, removal of the supporting shaft and overhead piece from the chassis of the projector provides a compact package that is light and occupies little space in an automobile. Figure 5 shows the chassis (A), supporting shaft and head (B); detachment and packing takes less than 10 seconds. The Delineascope has been proven to be sturdy and dependable under such usage. The 10″ x 10″ aperture will more than compensate in satisfaction of performance for the little extra time involved in disassembly and set-up.

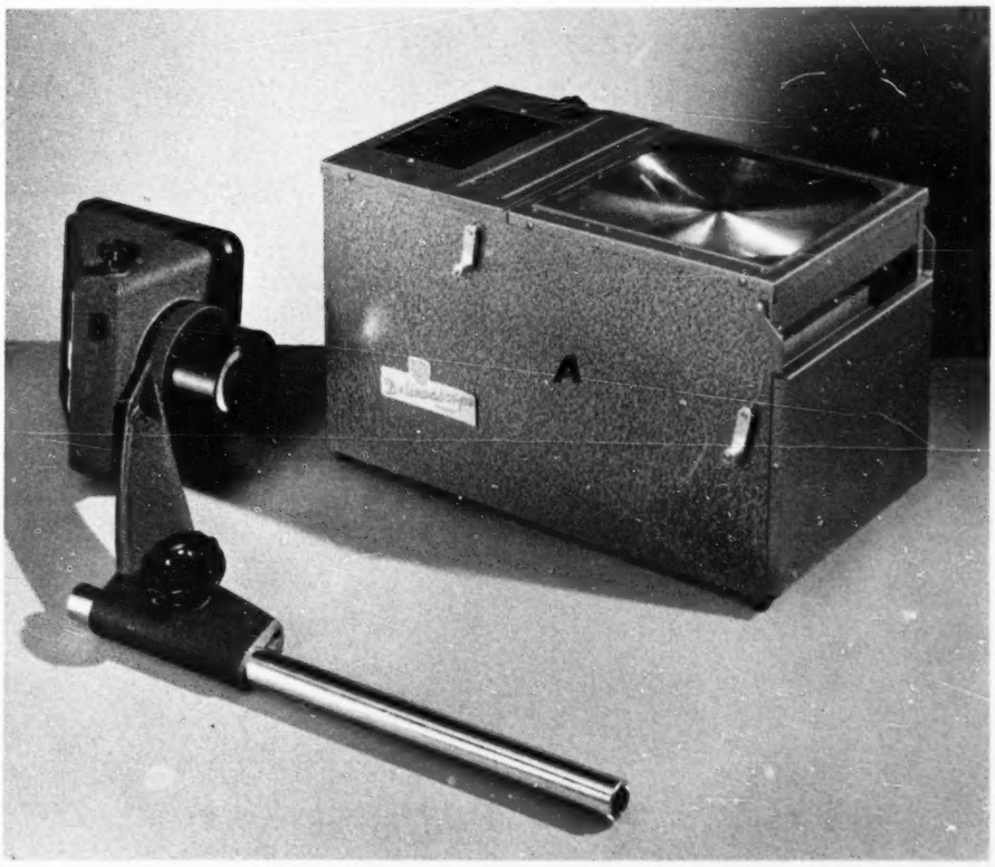


Figure 5

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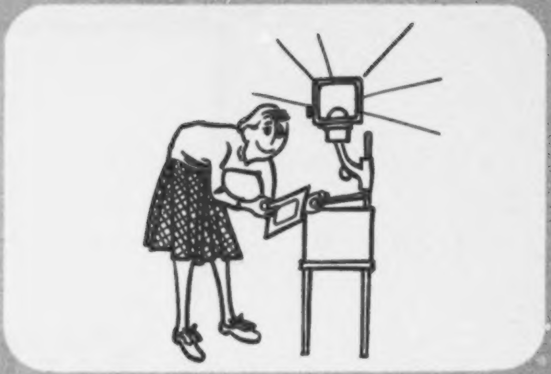
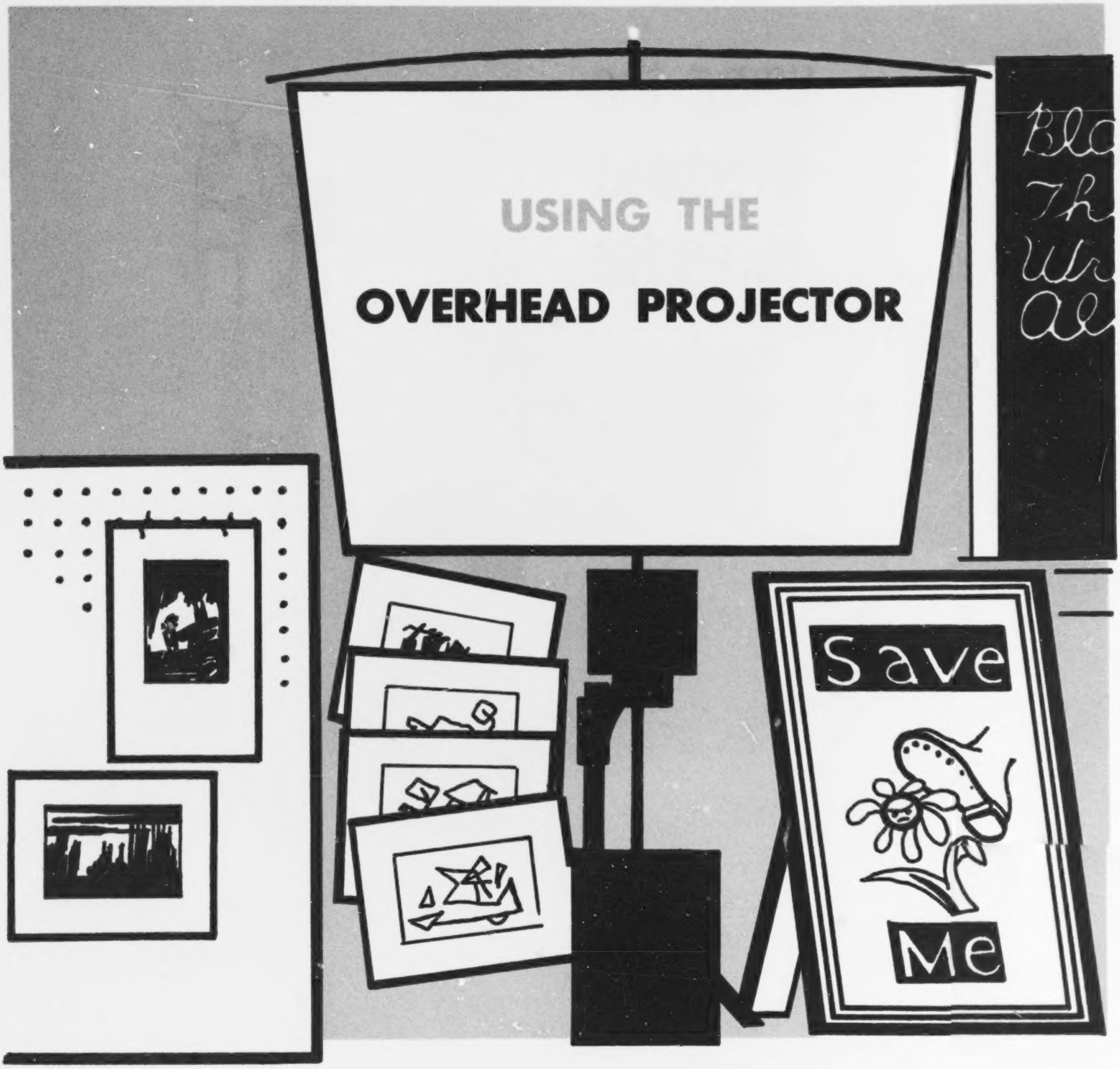
using the overhead projector



CHAPTER

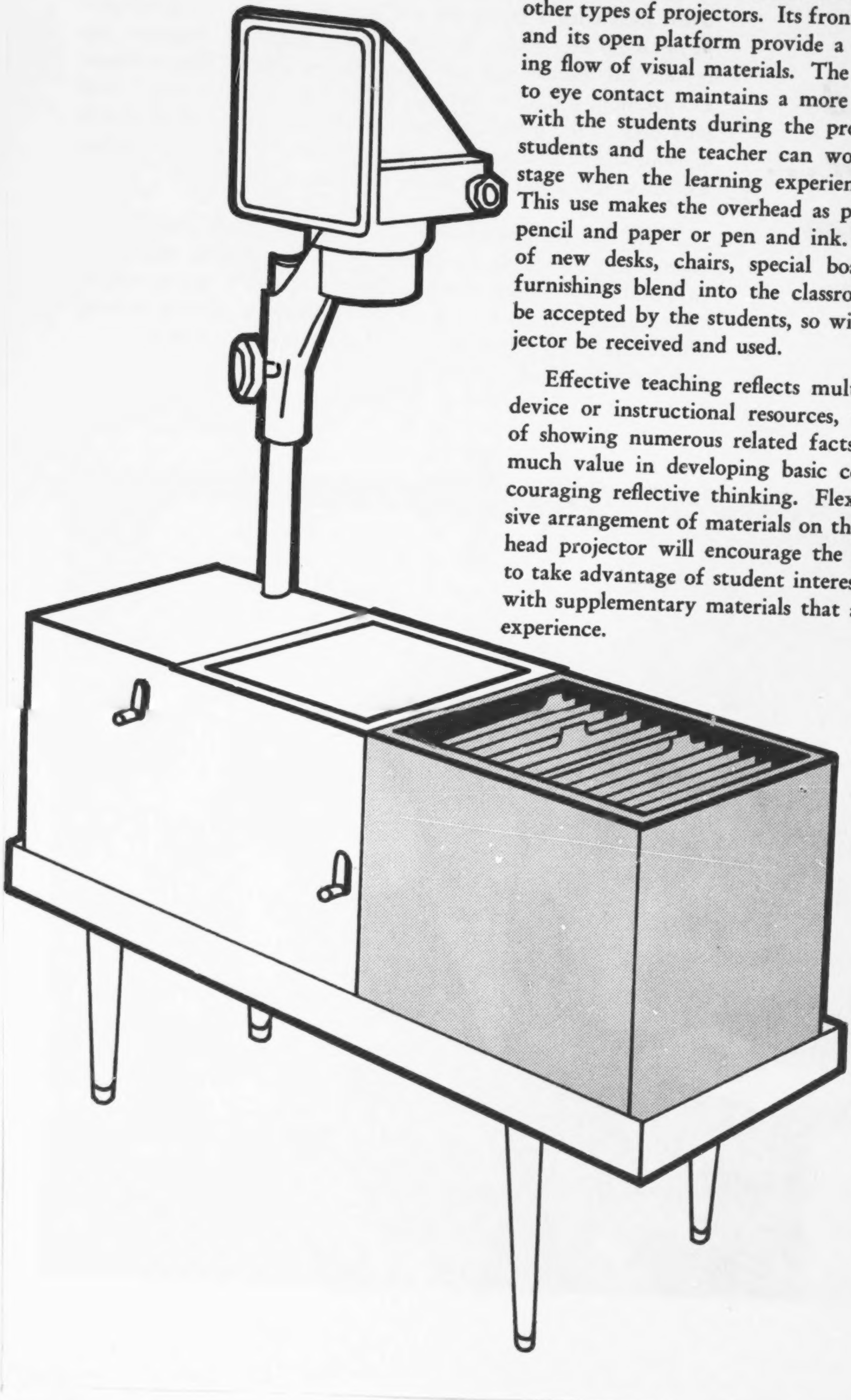
3

USING THE
OVERHEAD PROJECTOR



To relate a variety of advantages for the overhead projector without considering the purposes and objectives of teaching and learning could be little more than discussing meaningless "gadgetry." It could be as ineffective as receiving a new drug without directions for its use. The perspective of communication via the overhead projector must be in light of one's knowledge and understanding of learning and thinking.

Laws regarding learning remind us that learning must be made personal and purposeful. Communication devices must, therefore, become secondary in that each loses itself in the learning process.



The overhead projector tends to blend into the learning environment more naturally than do many other types of projectors. Its front of the room position and its open platform provide a continuous, connecting flow of visual materials. The teacher, through eye to eye contact maintains a more personal relationship with the students during the projection period. The students and the teacher can work from the lighted stage when the learning experience calls for its use. This use makes the overhead as personal a tool as the pencil and paper or pen and ink. Just as the novelty of new desks, chairs, special boards or other room furnishings blend into the classroom environment to be accepted by the students, so will the overhead projector be received and used.

Effective teaching reflects multiple learning. Any device or instructional resources, with the capability of showing numerous related facts at one time, is of much value in developing basic concepts and in encouraging reflective thinking. Flexibility and permissive arrangement of materials on the stage of the overhead projector will encourage the resourceful teacher to take advantage of student interest and to follow up with supplementary materials that add to the learning experience.

The Overhead Projector . . . A Pace Changer

Almost every new communication tool commands attention when used with a group for the first time. The overhead projector is no exception. As the newness wears off, however, the resourceful teacher will call upon its versatility. This is where the overhead projector becomes a significant pace changer. Not only does its use permit a variety of different types of materials to be produced and used, but it is an excellent working tool when used in conjunction with other materials and devices.

Overhead techniques may be combined with chalkboards, flannelboards, magnetic boards, motion pictures, maps, and charts to introduce a new dimension to these more widely used materials. Conventional methods such as demonstrations, dramatizations, discussions and lectures have added meaning when difficult concepts are visualized.

GRAPH FROM THE RADAR
SPEED METER

The Overhead Projector and Conventional Methods

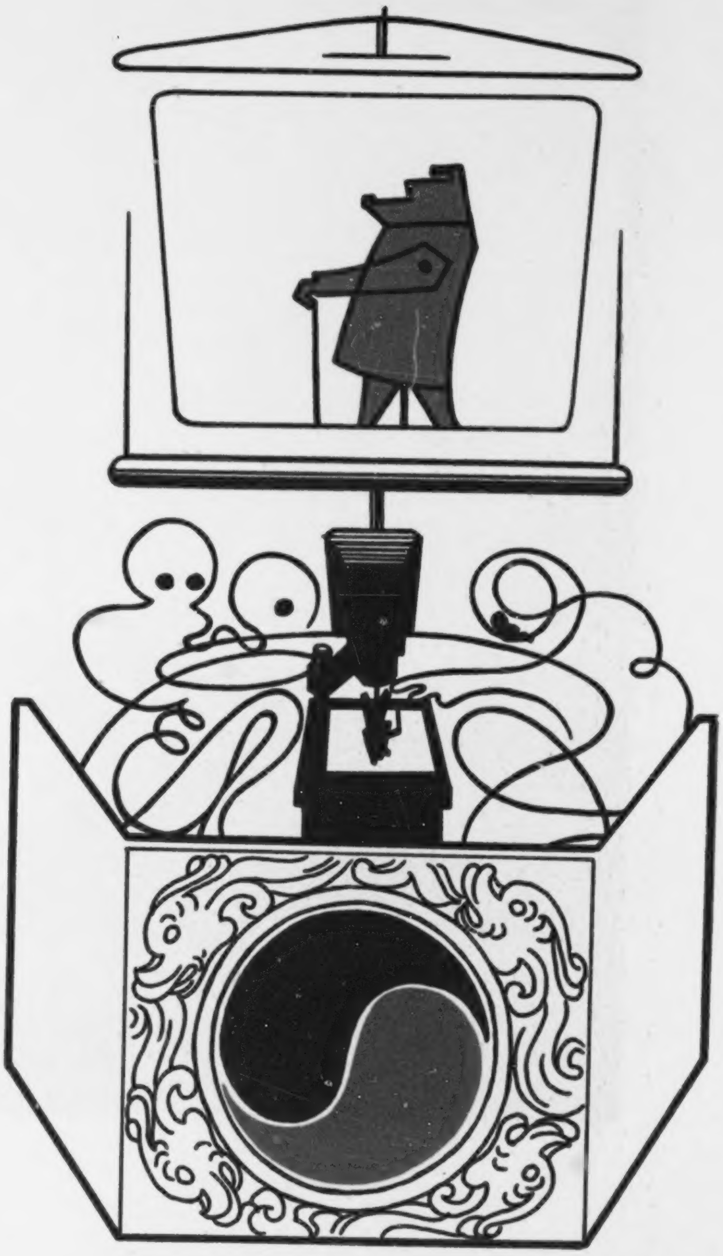
In Demonstration

In demonstrating a model or object, a large graphic is frequently needed. The stage of the overhead projector will allow the demonstrator to constantly reinforce learning by shifting from the demonstration piece to a projected graphic on the screen. For example, an instructor may wish to demonstrate the functional operations of a radar device. By having the students merely view the object, the instructor is forced to use excessive verbalism. To overcome this difficulty the instructor could prepare several transparencies consisting of diagrams and pictures that would give added meaning to the demonstration. By placing the projector adjacent to the device being demonstrated, the instructor has the flexibility of shifting from the material on the stage of the projector to the device at will and with ease.

In Dramatization

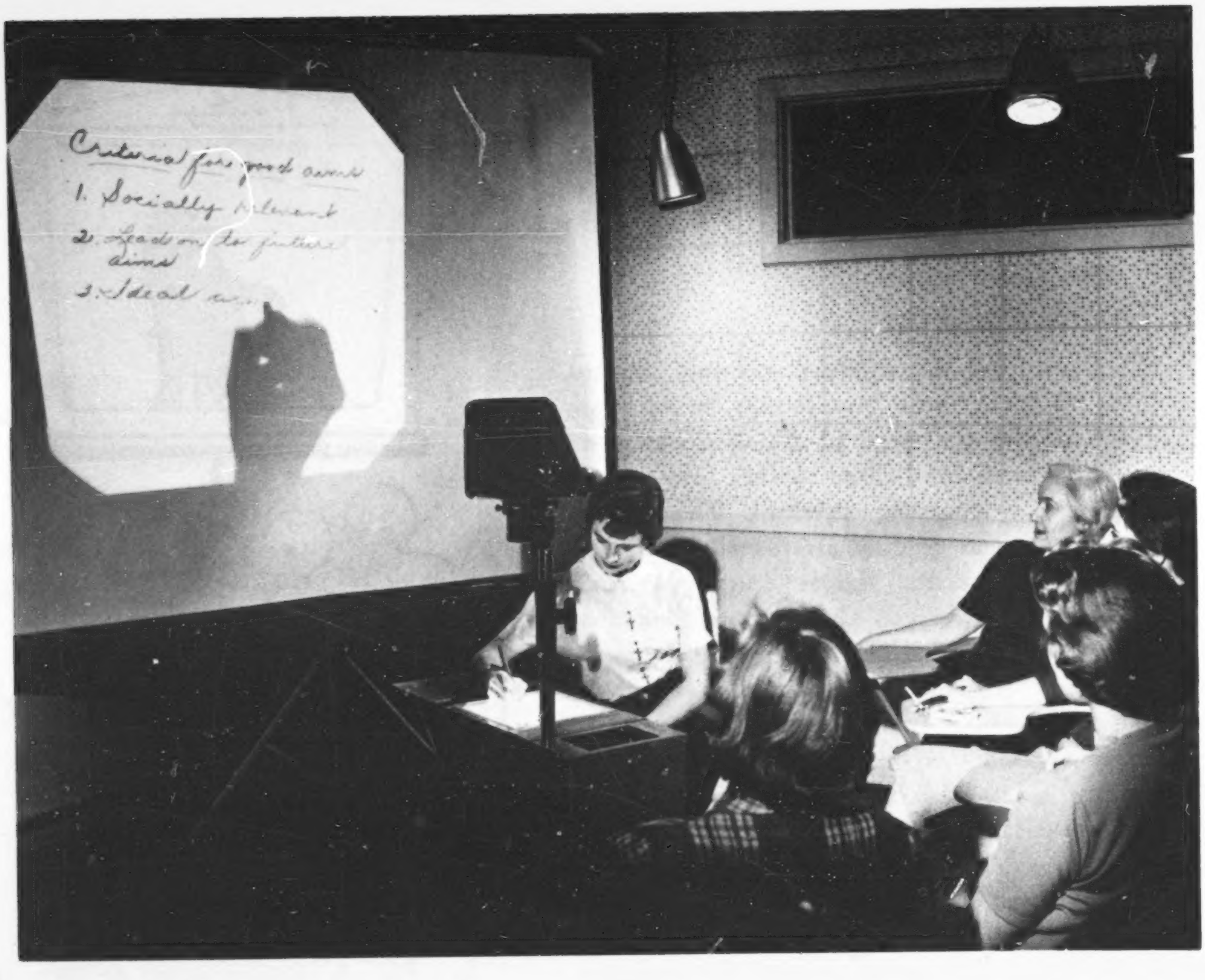
Silhouette and transparent cut-out figures mounted on transparent handles may be manipulated freely over the stage of the overhead projector. This turns the lighted surface into a stage for a variety of dramatic activities. The scenery may be changed as quickly as transparencies can be replaced. Students, maneuvering the stick puppets, may either speak the parts or they may depend on a tape or a disk recording for the sound. More mature students become quite skilled in making stick puppet characters that have moving parts. They enjoy making stage scenery from transparent sheets and construction paper. With the use of overlay transparencies, the stage scenery can be changed rapidly to give continuity to a variety of scenes.

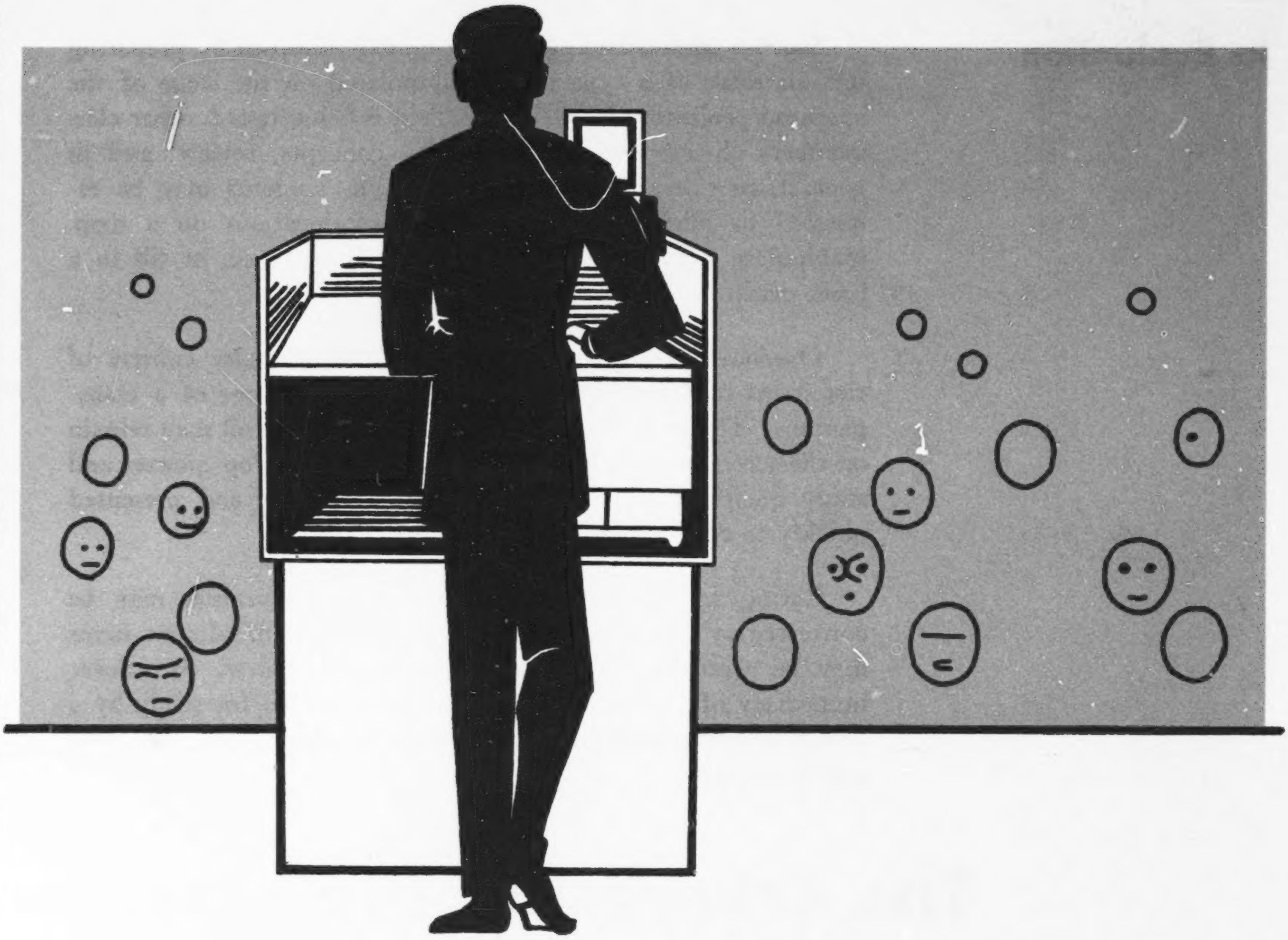
A special screen made from cloth, cardboard or plywood may be erected around the projector to hide the participants and the projector from the view of the observers. The projected images appear on a screen placed above and beyond the top of the frame for audience viewing. This technique is similar to a shadow screen often used to get youngsters to overcome shyness.



In Group Discussion

Group discussion is frequently sparked by immediate visual records of significant contributions being made. A most effective tool for this purpose is the overhead projector. It permits the recorder to remain a participant in the group while writing on the cellophane roll or frosted acetate sheets and to have the writing projected over the shoulder to the screen. The enlargement of the recorded information provides adequate viewing for small or large discussion groups. Such immediate recording of significant points discussed, not only encourages greater participation, but provides convenient means for transcribing and summarizing the discussion after the meeting.





In Illustrated Lecture

The overhead projector is ideal for illustrating lectures and for making semiformal presentations. As previously stated, it gives the lecturer the psychological advantage of maintaining eye-to-eye contact with the audience while referring to visual illustrations. The lecturer may work from a lectern with the overhead projector placed adjacent to it, or he may use the projector stage to support needed notes and transparencies. Maps, charts, photographs, and other graphic materials, generally used to illustrate a lecture are frequently draped unattractively around the performer. Too often they are cumbersome and distract from the presentation. Simply by the user withholding the visual until the need arises, materials in overhead transparency form overcome this difficulty.

Uniform materials permit more control and greater emphasis on key ideas. The lecturer may desire to expose thought-provoking materials in order to stimulate audience participation through discussion; or he may shut off discussion by shifting to more directed materials. Regardless of the plan, he retains an advantageous psychological position for effective communication.

In Evaluation

Student understandings can be quickly checked by preparing test materials of a type to be manipulated on the stage of the overhead projector. While one student is being tested, other class members observe and correct faulty concepts, review, and in general, reinforce learning. For example, students may be requested to punctuate a sentence, mark locations on a map, manipulate geometrical forms, diagram a sentence, or fill in a bank draft.

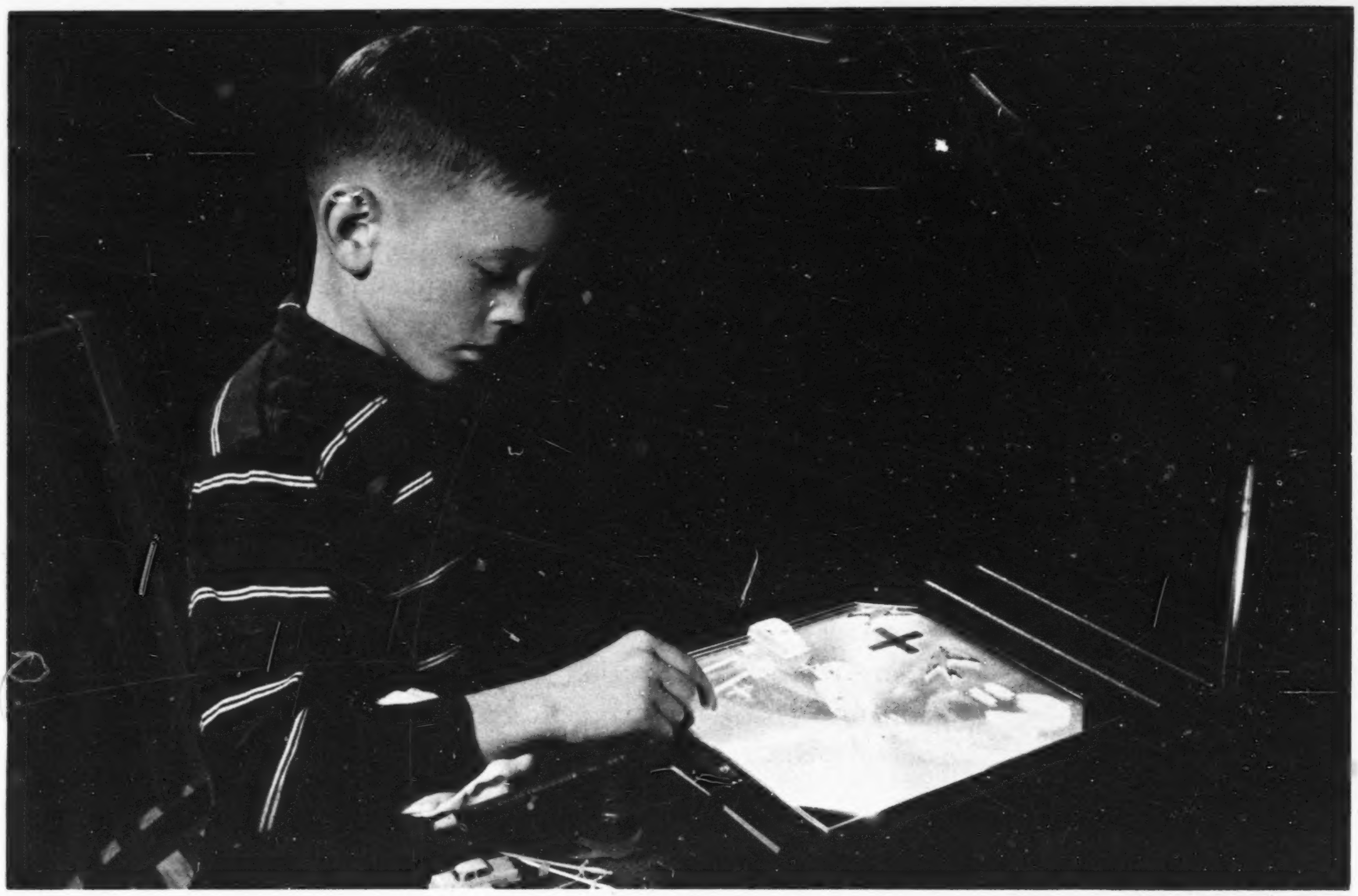
Overhead projection permits time and exposure control of test items by stripping opaque paper over portions of a transparency. Test items may be exposed in sequence and may remain on the screen or they may be presented singly. Pop quizzes and study questions may be prepared prior to class and presented quickly to conserve valuable class time.

Rating scales, evaluation forms, and test profiles may be converted to transparencies for group study; difficult test items may be arranged for quick reference and review. Whenever immediacy of tabulation and reporting is needed for study by a group, the overhead projector should be chosen for clear and readable results.

The Overhead Projector and

The Chalk Board

Practically every classroom and most assembly rooms will either have a permanently mounted or a portable chalkboard. Chalkboards make ideal surfaces for projecting a variety of exercises designed to involve group participation. Such projected chalkboard images permit students to write or draw on the board without disarranging the projected image. Chalk marks are quickly erased from the projected exercise, thus making it ready for other students to use. Exercises in arithmetic, word and sentence structure, maps and symbols, handwriting for comparison and identification of the parts of speech are only a few of the chalkboard experiences possible. As an example, a student in a social studies class might be asked to shade in a densely populated area of a projected map. After the chalkboard shading has been completed, a transparent overlay could be superimposed to quickly show the degree of accuracy. By erasing and correcting immediately, both the student exercising and those observing have a better chance to correct and to reinforce learning.



Classroom Surroundings

700 900 800 400 500 300
X6 X3 X5 X9 X4 X8
4200

The Flannel Board

Like the chalkboard, the flannel board surface may be used for projecting basic outlines needed for the arrangement of flannel board material. For example, a projected image of a room might be decorated with patterns of cotton flannel to show color and arrangement; or a projected image of a table might properly be decorated to demonstrate table setting for a variety of occasions; or an outline of an athletic playing field might serve to locate flannel cut-outs representing player's positions and movements.

The chief advantage in using the overhead projector in combination with a flannel board is to save time in providing basic outlines and forms needed for the development of a lesson. The surface of the flannel board permits the arrangement of larger size materials. If a study problem in driver education called for several types of road intersections, it would be impractical and costly to prepare each on a separate flannel board. With a drawing of each intersection prepared on a separate transparency, a flannel board or a magnetic board surface can be changed rapidly and effectively.

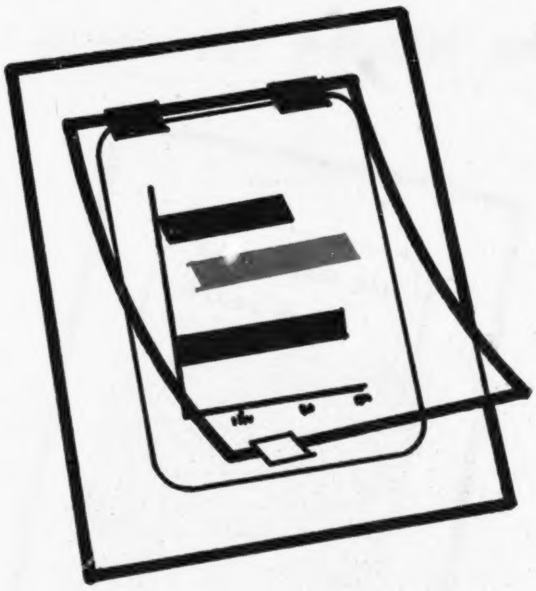
Special Overhead Techniques

There are several special overhead projection techniques to be used in providing variety to still transparent visual presentations. A single transparency may be used in the conventional slide manner or it may be exposed part by part, or compared by superimposing additional sheets. It may even have sections that move. Special overhead techniques include (1) overlay, (2) roll-on, (3) hidden, (4) animation, (5) technimation, (6) slip sheet and (7) cover sheet. Even more flexibility is possible when a combination of the techniques is employed.

The Overlay Technique

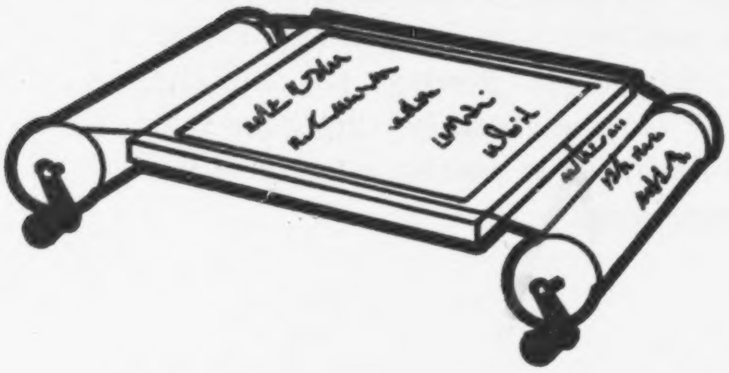
When prepared drawings are registered to match and each drawing is transferred to a separate transparent sheet and hinged to a special mount, they can be superimposed during projection. This technique is referred to as "overlay." By hinging the transparent sheets to the mounting frame, one is assured of exact matching. If matched transparencies are to be projected by superimposing without hinging, each sheet should be mounted to a separate frame. This unhinged use is referred to as a "drop-on."

The overlay technique works best in a developmental presentation. A composite picture can be formed by showing a sequence of parts to form the whole. For example, an automobile engine is to be studied. The instructor proceeds to develop an overlay transparency for showing in sequence the various systems of the engine. During the presentation he paces the use of each sheet to correspond to the response of the group. The final exposure completes the presentation by bringing a composite picture of the engine to the screen. If understandings are not clear, several of the overlay sheets may be lifted and reused. The overlay technique is a most significant advantage of the overhead projector.



OVERLAY

The Cellophane Roll Technique

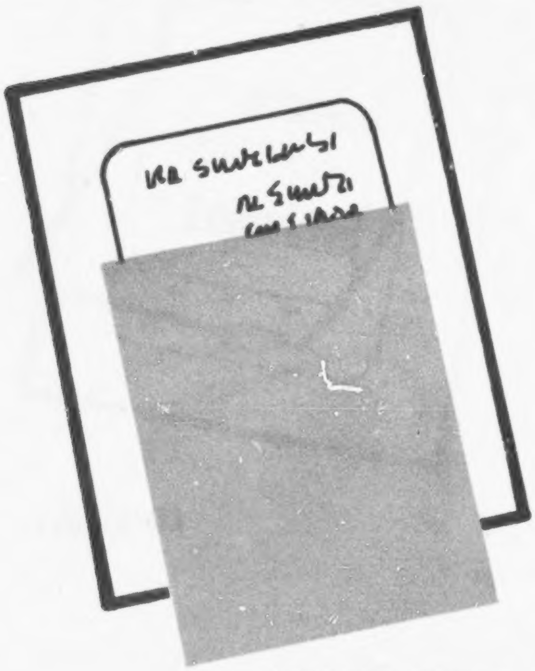


CELLOPHANE ROLL

Most overhead projectors have an attached cellophane roll, up to 100 feet in length, for use in writing, marking or drawing with a wax pencil. The cellophane is controlled by two cranks to roll it forward or backward. Outlines, special drawings, charts, research data, tests and special exercises are frequently presented by this technique. The information may be prepared ahead of the scheduled presentation and moved on to the stage of the projector when needed. Or this technique may be used instead of the chalkboard; it has the distinct advantage of your being able to face your audience and of your being able to talk *to* them. Also, of course, only a simple turn of the crank provides more clean surface for writing or drawing.

If a previous presentation is needed for purposes of reteaching or for review, the teacher can refer back to the proper section of the roll. Preparation of the roll may take place out of class by detaching the roll from the projector. Several persons using the same projector may obtain their own acetate rolls and install them as they are needed. The cellophane roll technique provides an effective means of reproducing last week's outline, drawing, or problem solution for today's review.

The Hidden Technique

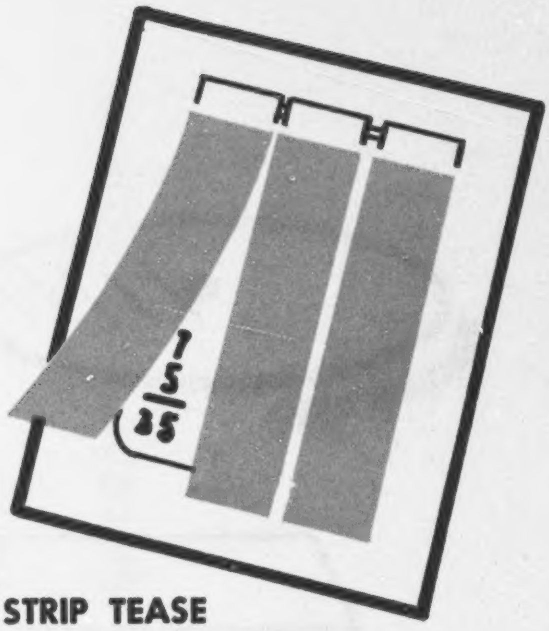


COVER SHEET

A variety of techniques may be used to hide materials from the viewer. Such techniques are psychologically sound in that they provide an element of timing to capture the most advantageous learning moment. In a sense the overlay and the cellophane roll are hidden techniques. However, the two terms generally applied to hidden materials are (1) "cover-sheet" and (2) "strip-tease."

A sheet of typing paper, placed over a transparency containing a list of items or an outline, may be used to block out a portion of the content until such time as exposure is desired. This form of hiding materials is referred to as the "cover-sheet" technique. The cover-sheet will allow the user to see the entire content without exposing the covered portion to the viewing audience.

The "strip-tease" technique is the arrangement of strips of construction paper mounted over the transparency to hide its content. During projection the screen remains black until the strips are removed. Opaque cover sheets, grooved, slitted or grommeted, may be applied to produce a similar effect.

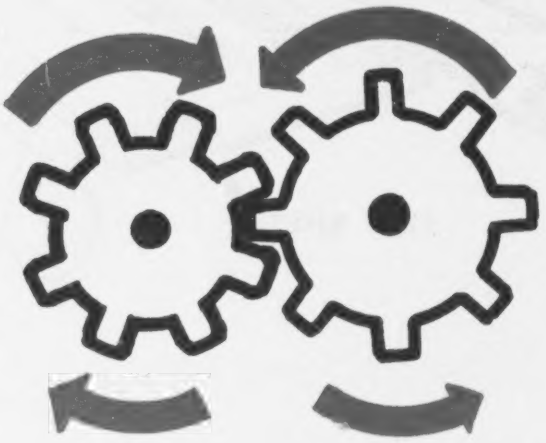


STRIP TEASE

The Animation Technique

A major advantage of the overhead projector is its capability of capturing the movements that take place on its stage. Writing, marking or drawing on the cellophane roll, a frosted sheet or a transparency provides a degree of animation during projection. Pencils, finger, and hand movements are registered in silhouette on the screen.

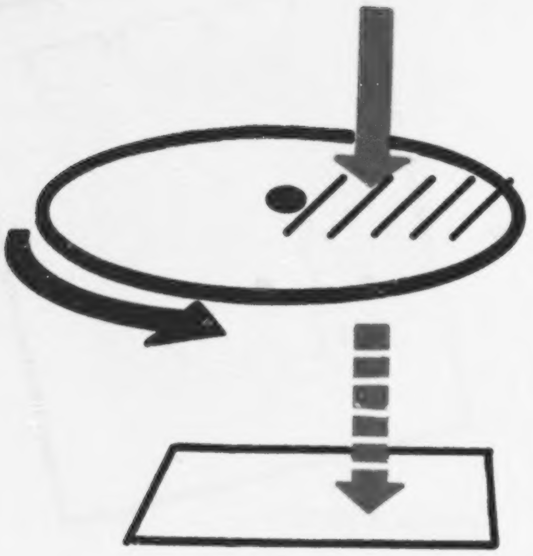
A variety of flat transparent plastic objects with working parts are currently being used by instructors to show moving parts in relationship to the whole. An outstanding example of this technique is the use of a plastic model of the army 45 caliber pistol. Its parts, reproduced in several transparent colors, can be manipulated to actually perform the movements required to inject, fire, and eject. Here, a sense of realism is added to what would normally be a static drawing or photograph. Bone and socket movements, gear movement and finger movement on a replica of a typewriter keyboard are only a few examples where the animated technique can be used.



ANIMATION

The Technimation Technique

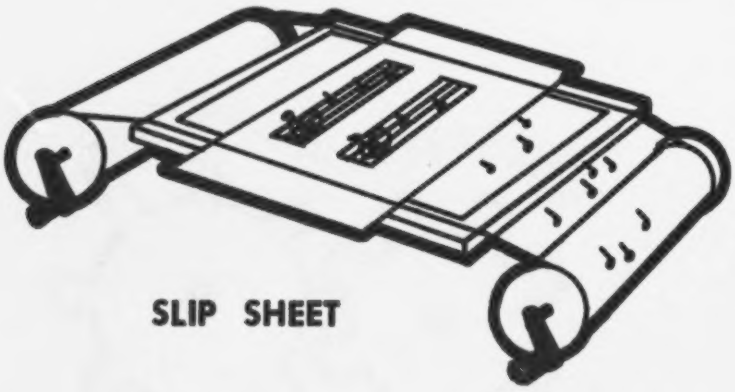
Technimation is the newest form of animation. There is a new pressure sensitive material called technimation, offered by American Optical Company, that can be added to transparencies to give vertical, horizontal, diagonal and circular continuous movement. The technimation materials are made from a polarizing substance that has been creased. If this material is applied to a transparency and placed on the stage of an overhead projector that has a revolving polarized disk mounted between the projection lens and the stage,



TECHNIMATION

motion will appear on the screen. In other words, to have motion by technimation requires light to pass through two polarized planes. The polarized plane breaks the rays of light sufficiently to cause the optical illusion of continuous motion. By this technique, wheels can be made to move, direction of movement can be shown and intermittent exposures can be made in the projected image on the screen. Technimation techniques offer new and exciting possibilities in the use of transparencies.

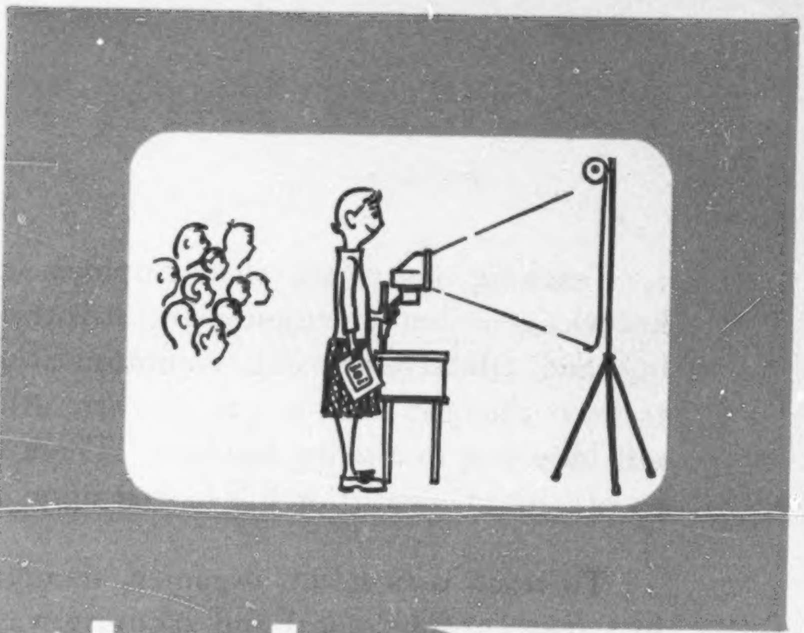
The Slip Sheet Technique



SLIP SHEET

Outline drawings, pictures, maps and graphs prepared on transparent sheets may be fitted over the stage of the overhead projector and beneath the cellophane roll to permit the roll to slide over the basic graphic. The slip sheet provides an easy means for the user to add additional drawings or markings without directly applying them to the transparency. This technique permits a basic transparency to become fixed for repetitive use. To clear the surface marks from the slip sheet only requires cranking on an unused portion of the acetate roll.

teaching with the overhead projector



CHAPTER

4

TEACHING WITH THE OVERHEAD PROJECTOR

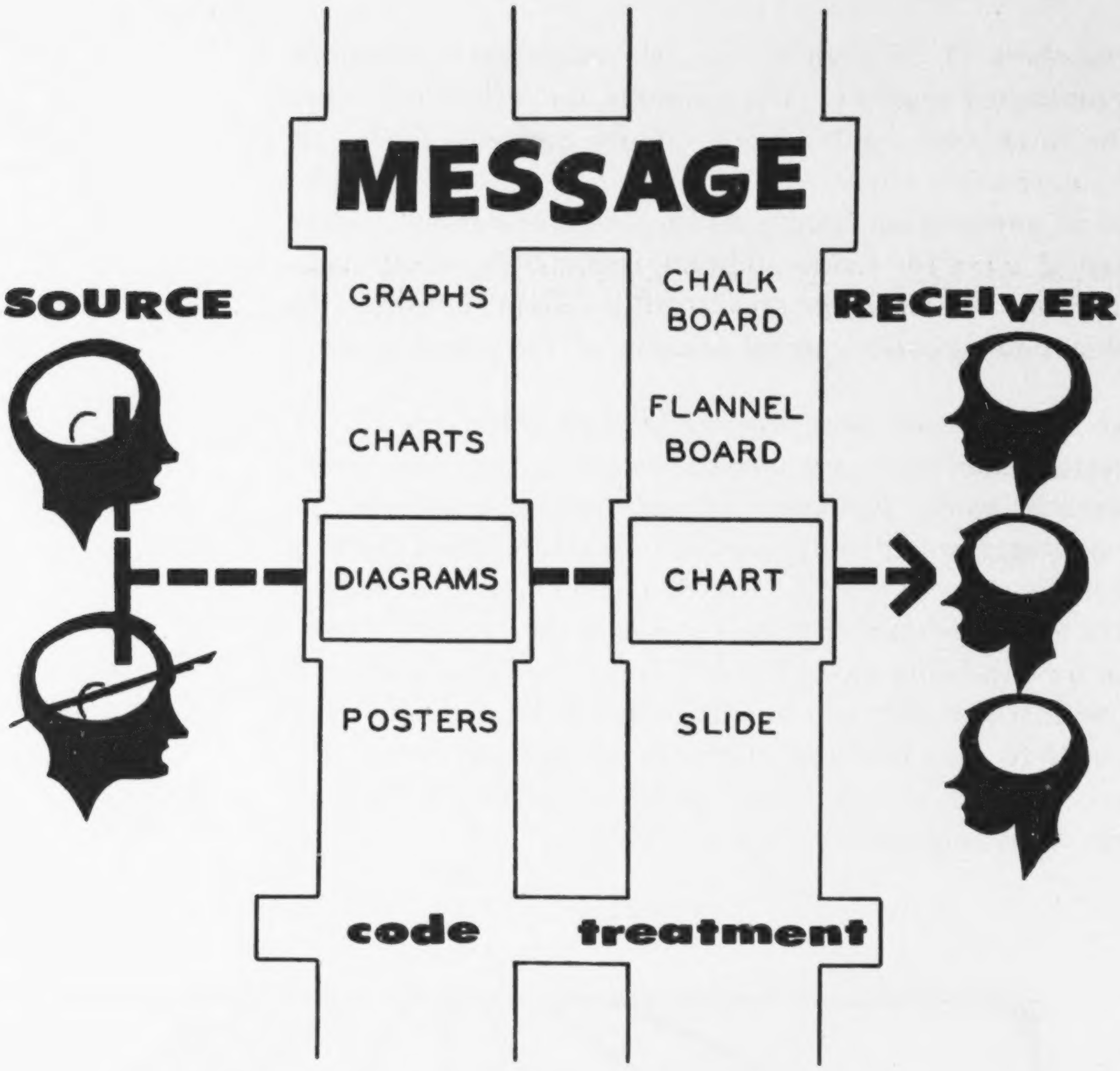
Teaching is an art that employs scientific and technical knowledge in human engineering; it is the process of understanding and effectively using communication tools to effectively transfer thought from one to another. All who propose to transmit ideas are, in a sense, teaching. Those who practice the art in an organized institution are looked upon as professional teachers.

To teach is to select, organize, arrange and present materials in a meaningful, logical and accurate way; to provide a variety of materials and experiences for the learner; to evaluate the performances of the learner.

A Look at the Problem

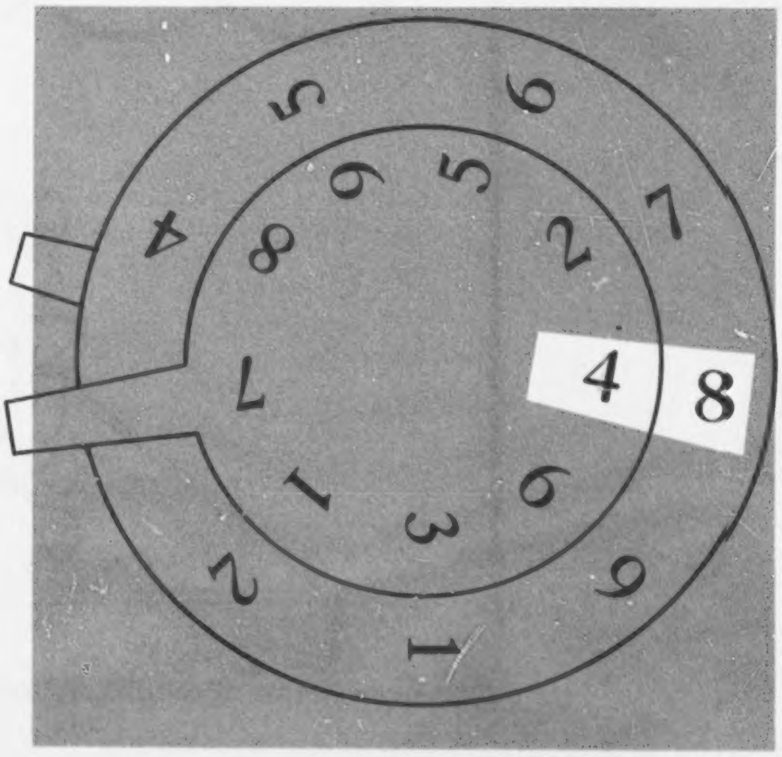
Increased demands on goods and services from industry, agriculture, transportation, and medicine have set in motion needed research, discovery and development of new tools and materials to improve results and increase output. Similar demands have recently been placed on the teaching profession to increase learning and to organize programs that will give more meaningful experiences in a shorter period of time. Our changing world, with its technological, social and scientific discoveries, has multiplied many times over the subject content of books and recorded information. Text books alone have many more pages than books of a couple of decades ago. This is to say nothing of the increased number of supplementary books, collateral readings and constant changes in content.

The problem is one of reorganizing and re-tooling to meet new learning demands. For years, commercial concerns have been at work designing and developing new and better communication tools. These tools, with instructional materials applied at the proper psychological moment, become time-savers in learning; they develop and sustain interest; they clarify concepts; and properly used, they provide a dynamic quality to teaching which can be achieved in no other way. The teaching profession itself should be taking the lead in experimenting, researching and suggesting designs needed. Teachers should be sensing the need and demanding that more communication tools and materials be made available in every classroom. No more than in industry, business or medicine can teachers increase their efficiency without proper tools for the job.


MESSAGE
SOURCE
RECEIVER
GRAPHS
CHARTS
DIAGRAMS
POSTERS
CHALK BOARD
FLANNEL BOARD
CHART
SLIDE
code
treatment

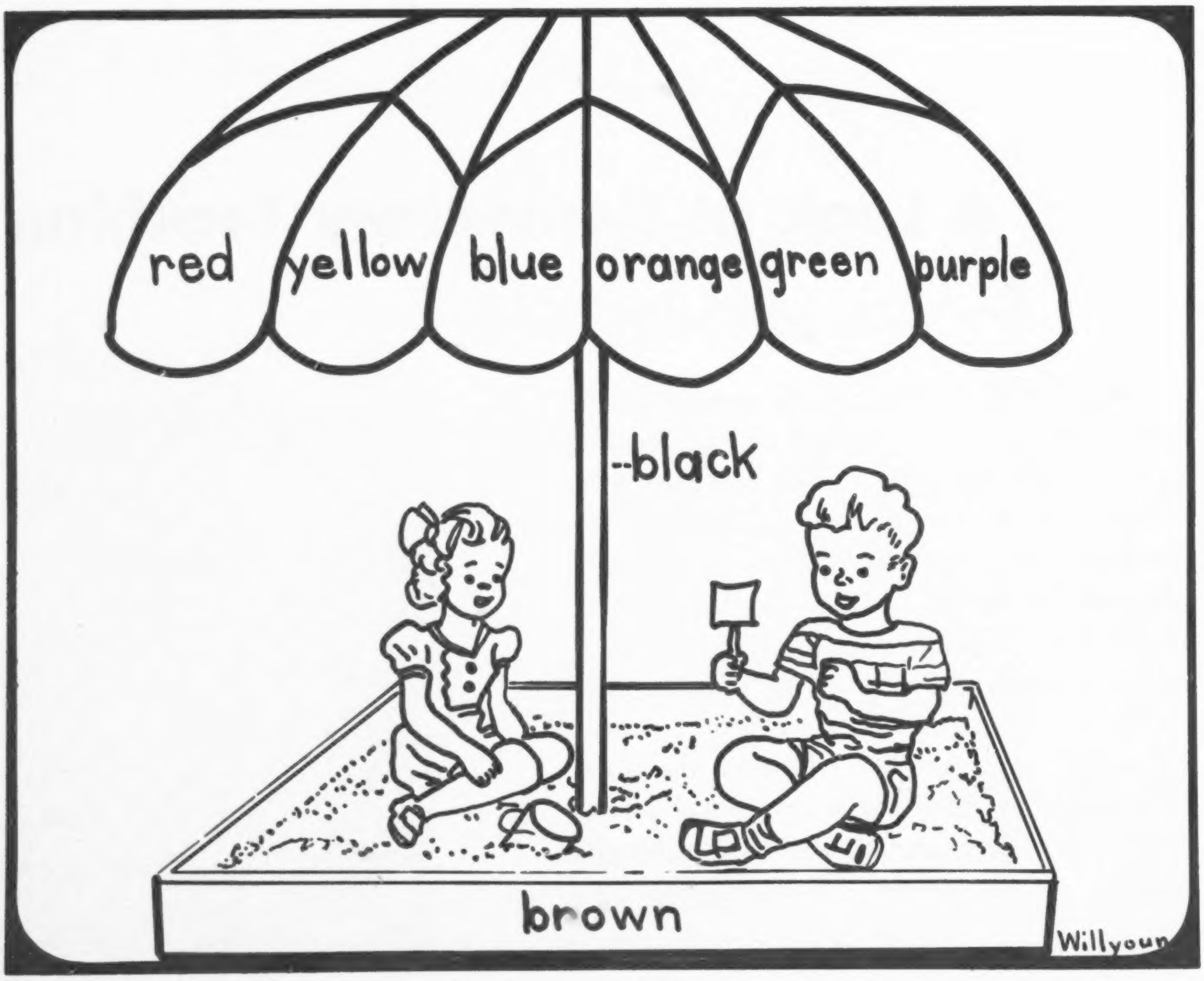
A Look at Elementary Teaching

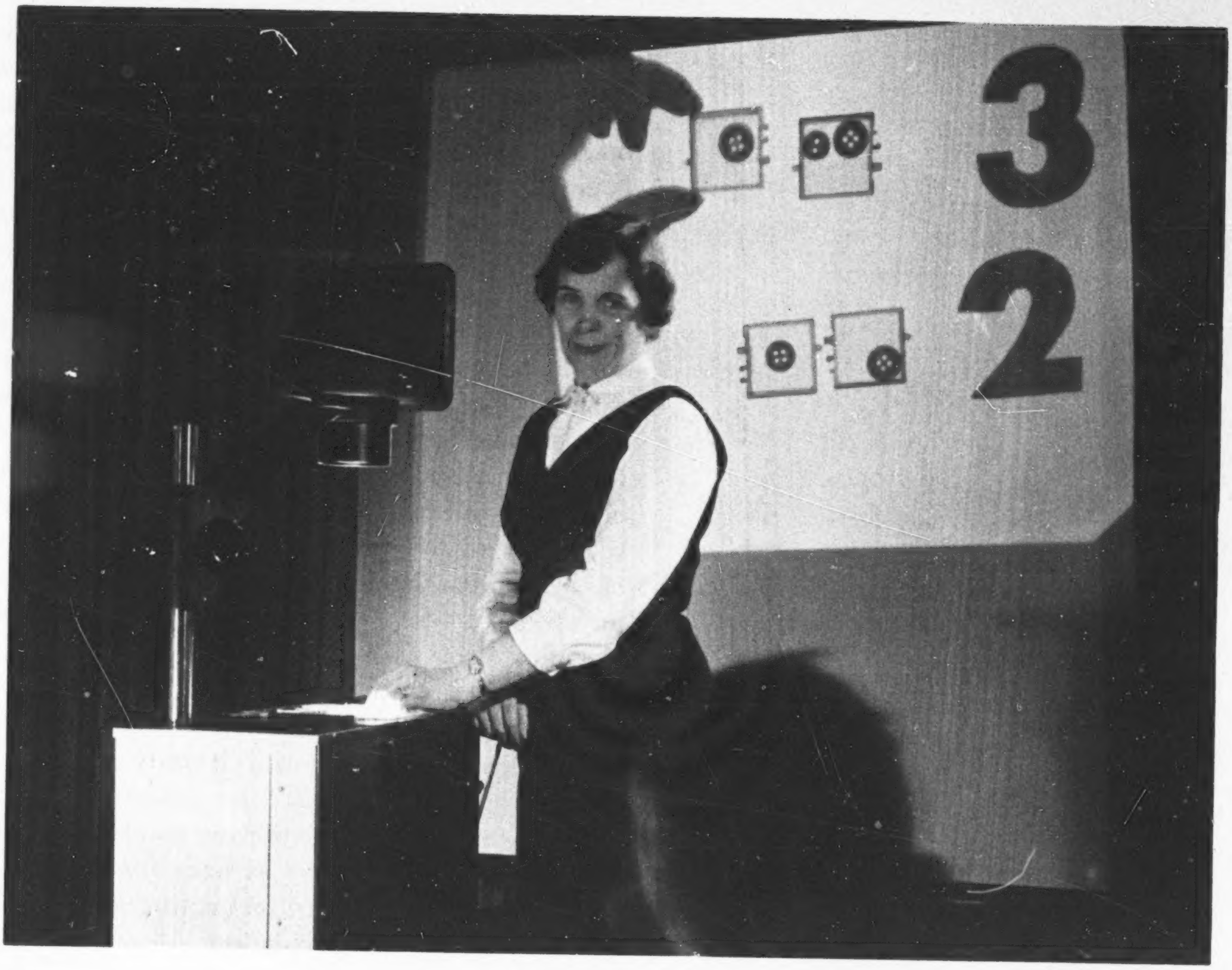
Many of the techniques of overhead projection previously described can be worked to re-vitalize teaching of the language arts, science arts and social studies. Elementary teachers need an abundance of exercise material in order to provide meaningful repetition. Versatility of the overhead projector permits the teacher to prepare materials in compact form. Often a single 10″ x 10″ transparency will take the place of a stack of flash cards or several charts or graphs. For example, one teacher taught number combinations by arranging two



sets of numbers (1 through 9) on two moveable transparent wheels grommeted together. The numbers, on each wheel, were spaced to form new combinations rapidly and effectively. A sheet of construction paper with a window opening was used to block out all numbers not being used for the combination. Proper mathematical signs for either addition, subtraction, multiplication or division were made on the attached cellophane roll to fit the combinations appearing in the window of the transparency.

Many teachers now using the overhead projector say that it is the greatest innovation ever offered for saving time and speeding up exercise work. Reading readiness, number combinations, number concepts, word study, sentence structure, hand writing and comparison, color identification and map study are only a few of the teaching-learning situations where the overhead transparencies are now being used. The low cost of such materials and the ease with which they can be duplicated makes it feasible for each teacher to keep the transparencies in her own room for presentation and re-use whenever needed. Yesterday's exercises are always ready and available for today's use.

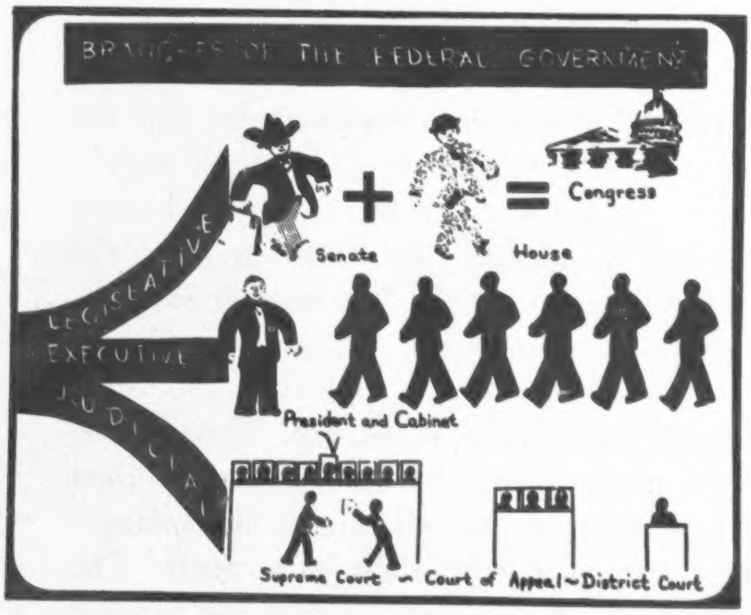




Small objects and silhouettes, both opaque and transparent, may be used in a variety of ways. For example, in arithmetic, the teacher can use small objects for teaching combinations and for developing number concepts. A box of buttons, an ample supply of aspirin boxes for use at the students' desks, and several small transparent plastic boxes for the teacher's use on the stage of the overhead projector are all that are needed. The teacher suggests that the students arrange their aspirin boxes, at their desks, in the form of a train, house, or some other design. She then tells them to locate a number of buttons in each car, room, etc. The teacher, using plastic boxes on the stage of the overhead projector, then proceeds to carry out the exercise so that all can see the enlargement on the screen and compare it with their own work. The students are active participants in the exercise and the teacher can readily determine where individual help is needed.

It would be impossible to indicate all of the ways that an elementary teacher might make use of the overhead projector. However, a quick summary of some of the possibilities is offered with the hope that many new materials will be created. Outline maps of typographical or political features can be prepared; map symbols may be inserted by means of grease pencil, cut-outs, dots, or other symbols. In this way it is readily possible to depict basic concepts of longitude and latitude, political organization, products, industries, climate and population. Special overlays matched to outline form, either attached to the slide or used as drop-on sheets, will save the teacher time in presenting such basic materials. In the language arts, opaque or transparent letters may be used in the study of spelling, root words, prefixes and suffixes. "Demon" letters, in commonly misspelled words, may quickly be shown by means of contrasting color. Words in sentences may be cut into transparent strips for arrangement in study of the parts of speech. Sentences may be projected on the chalk board for punctuation or special marking. Photographs may be used as basis for developing experience reading charts, for picture study or for general purposes of clarification.

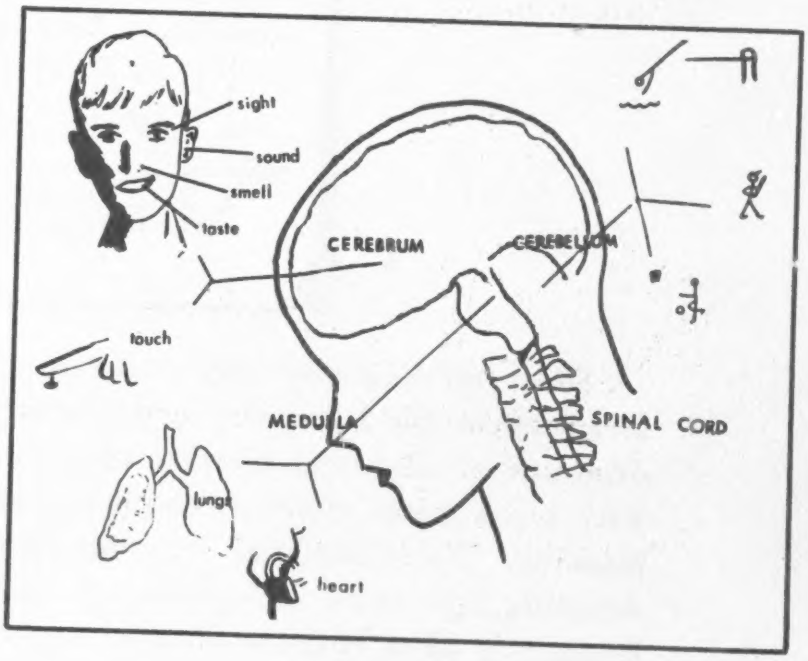
A Look at Secondary Teaching


BRANCHES OF THE FEDERAL GOVERNMENT
LEGISLATIVE
EXECUTIVE
JUDICIAL
+
=
Congress
Senate
House
President and Cabinet
Supreme Court ~ Court of Appeal ~ District Court

In similar manner to teachers in elementary schools, secondary teachers may employ overhead techniques in presenting a variety of subject areas. Secondary teaching with the overhead differs primarily in the arrangement of somewhat more complex materials. The principles are the same at both levels and the possibilities equally great.

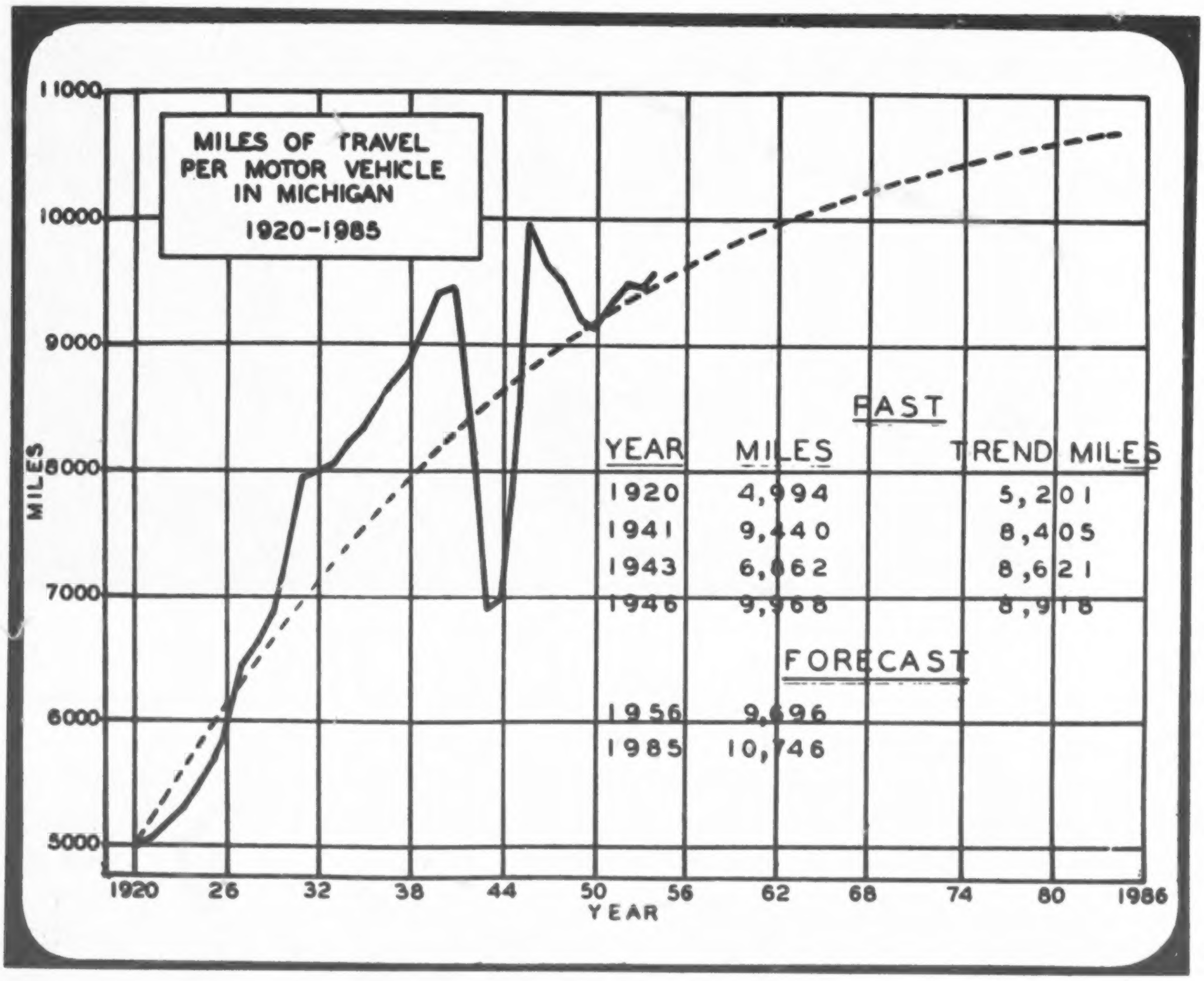
Overlays seem to be the key to unlocking many difficult teaching-learning problems because they permit the introduction of numerous factors. For example, the introduction of the branches of the federal government at the junior high level requires an understanding of the relationships of the many parts to the whole. One teacher uses a transparency with attached overlays to show separation of powers, the check and balance system, and the component parts of the three major divisions of government. The use of the transparency provokes considerable class discussion, and a marking pencil is used to insert information regarding qualifications, method of appointment, lengths of terms, and number and types of positions. A similar slide was developed to simplify the complicated meanderings of a bill from its introduction to enactment.

A geometry teacher might use a series of transparent overlays for rapid comparison of geometric figures in proving theorems and axioms by superimposing figures and by the use of accurately cut transparent plastic geometric shapes. Another teacher of math, at the secondary level, introduced surface formulas by drawings and cut-outs of a variety of surface shapes. Mathematics teachers will find the overhead projector a time saver in preparing solutions to complex problems and presenting them on the screen as examples.



The teaching of the physical and the biological sciences depends, to a great extent, upon complex charts, graphs, and photographs. Too frequently the charts are static and too small for the class to see well. Teachers frequently find that they need to mark on the surface of these materials. By changing such materials to transparency form, the overhead projector provides sufficient enlargement of these materials, and at the same time, permits surface markings without damage.

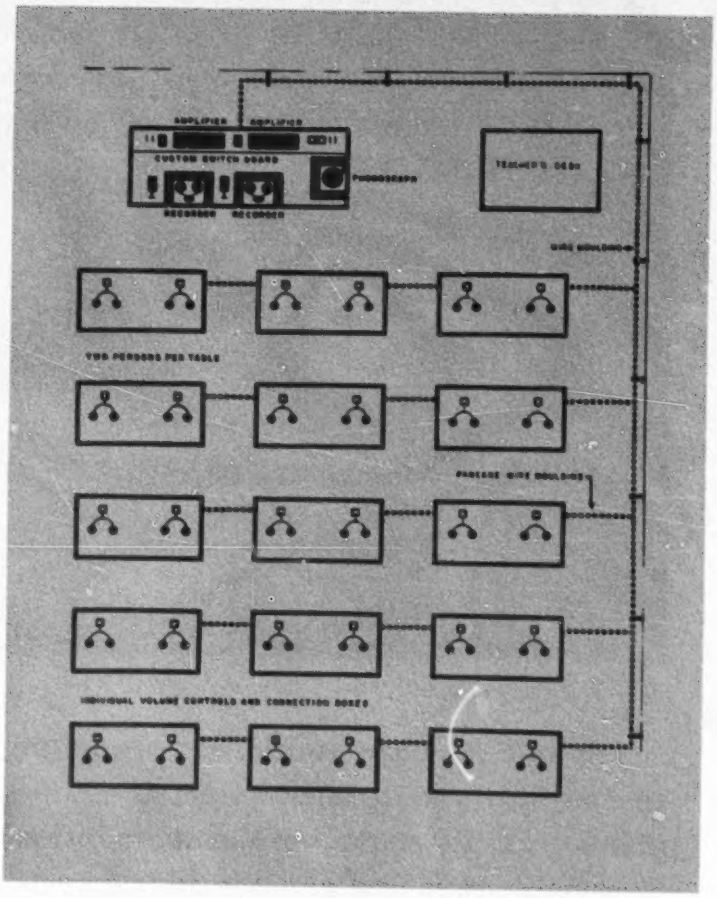
Basic and supplementary charts, heretofore, have been arranged on chalk boards and poster boards with much expenditure of time and cost, and, too frequently, the material is either soiled or destroyed. Again the overhead transparencies may be quickly cleaned and preserved for review and further use. Once the original art work is prepared, multiple copies can be economically and quickly developed.

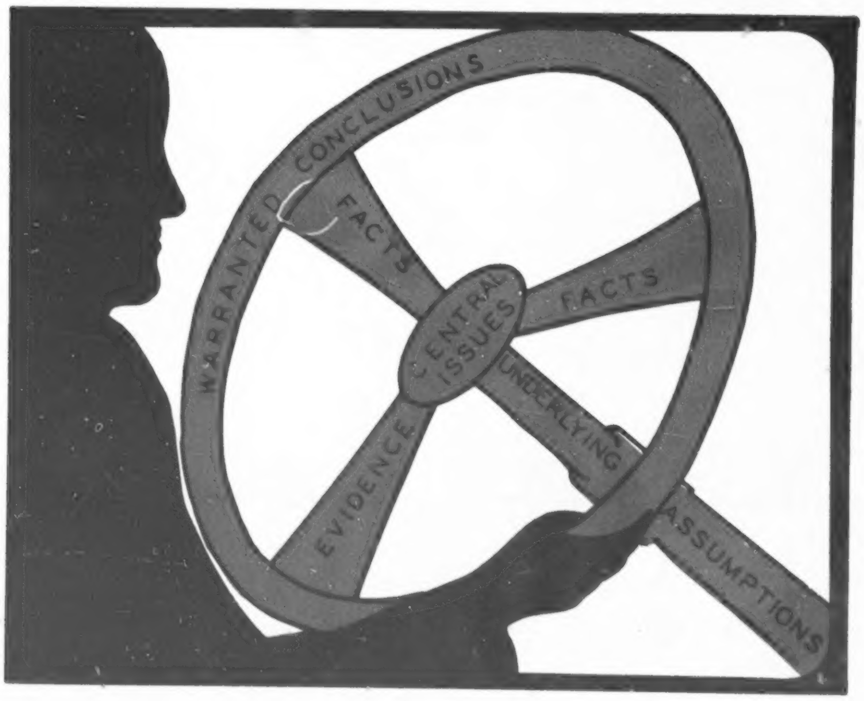


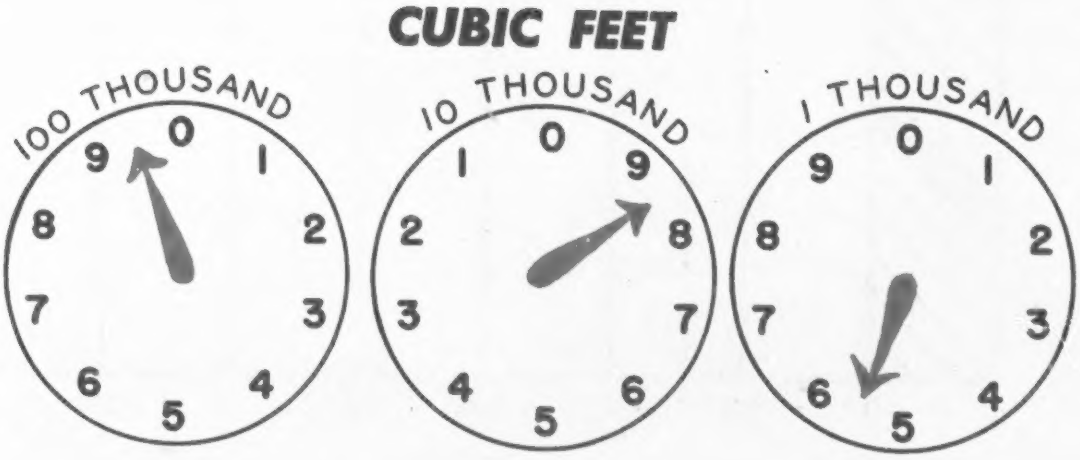
Slides on anatomy and function, apparatus arrangement for laboratory experimentation, and diagrams of electrical circuits may be prepared with technimated effect to emphasize and to add meaning. These materials become timesavers in directing laboratory experiences of the students. Frequently light boxes, with glass surfaces cut to the shape of the transparency material, are placed in the laboratory, library, or special study rooms for self-teaching purposes. There is almost no limit to the creative applications of transparencies in the sciences.

Language arts teachers have applied overhead techniques to letter writing, sentence diagraming, word studies, sentence structure and punctuation, modern foreign language vocabulary development, outlining, charting, dramatics, and speech. For example, modern foreign language sentence structure may be compared to an English language sentence by means of overlays.

Industrial arts teachers may develop plastic forms to show gearing, jointing and fitting. Or the agriculture teacher may find overlays useful for studying animal structure, judging, or charting relationships in genetics.

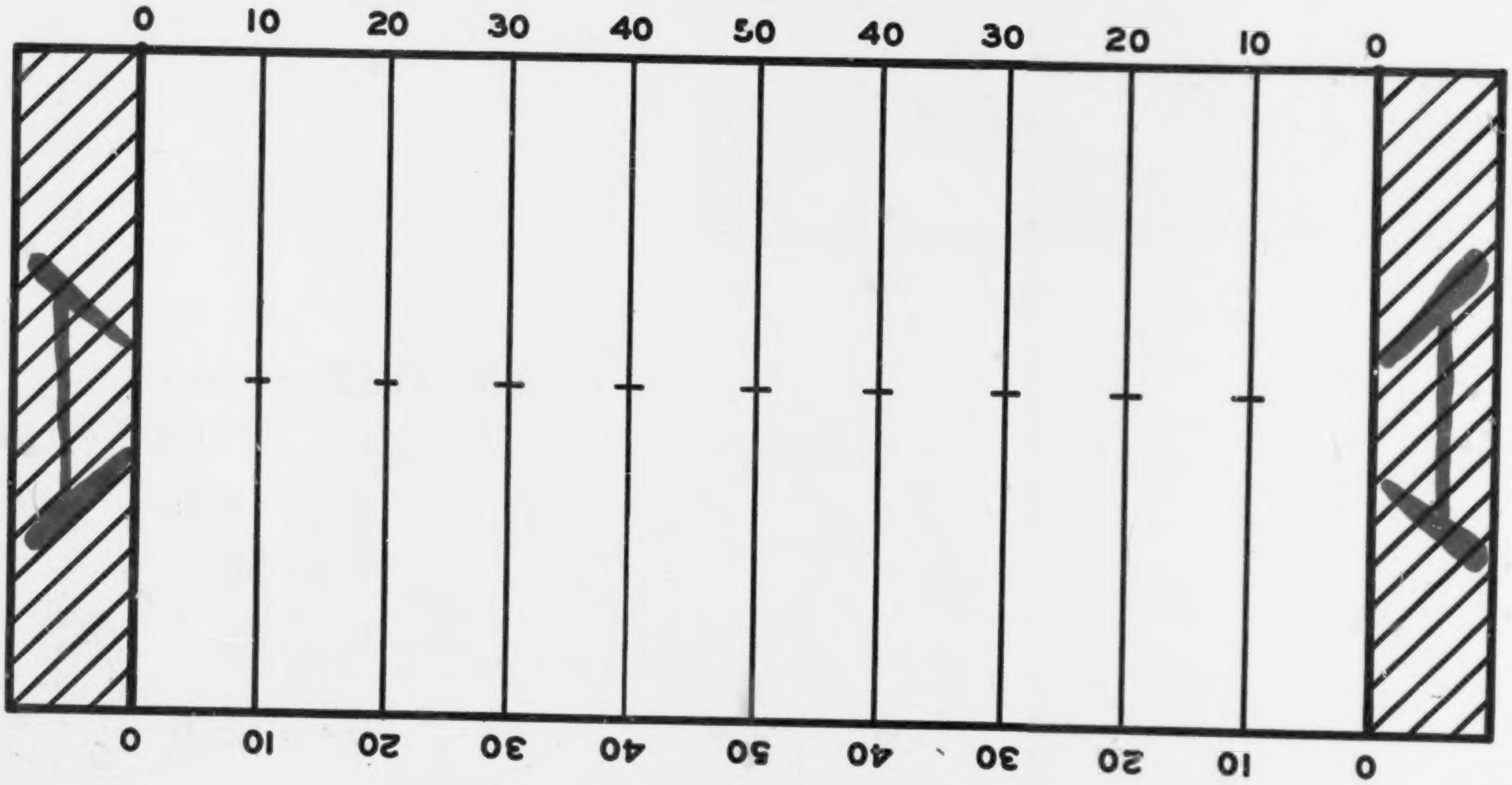

AMPLIFIER
AMPLIFIER
CUSTOM SWITCH BOARD
RECORDER
RECORDER
PHONOGRAPH
TEACHER'S DESK
WIRE MOULDING
TWO PERSONS PER TABLE
WIRE MOULDING
INDIVIDUAL VOLUME CONTROLS AND CONNECTION BOXES


WARRANTED CONCLUSIONS
FACTS
FACTS
CENTRAL ISSUES
UNDERLYING
ASSUMPTIONS
EVIDENCE


CUBIC FEET
100 THOUSAND
10 THOUSAND
1 THOUSAND
0 1 2 3 4 5 6 7 8 9
0 9 8 7 6 5 4 3 2 1
0 1 2 3 4 5 6 7 8 9

In fine arts, the music teacher might use a transparency of the musical signature and staff as a slip sheet beneath the cellophane roll to show simple composition. By having the staff stationary, prepared compositions may be rolled into position on the lines and spaces, or the teacher may use a wax pencil and work directly on the cellophane roll. Art teachers have an excellent opportunity to develop overhead materials that quickly and effectively present concepts of design, composition, shape, perspective, form, and color.

In considering the areas of health and physical education, scale drawings, charts and graphs are excellent in introducing various aspects of sports. Scale drawings of playing fields may

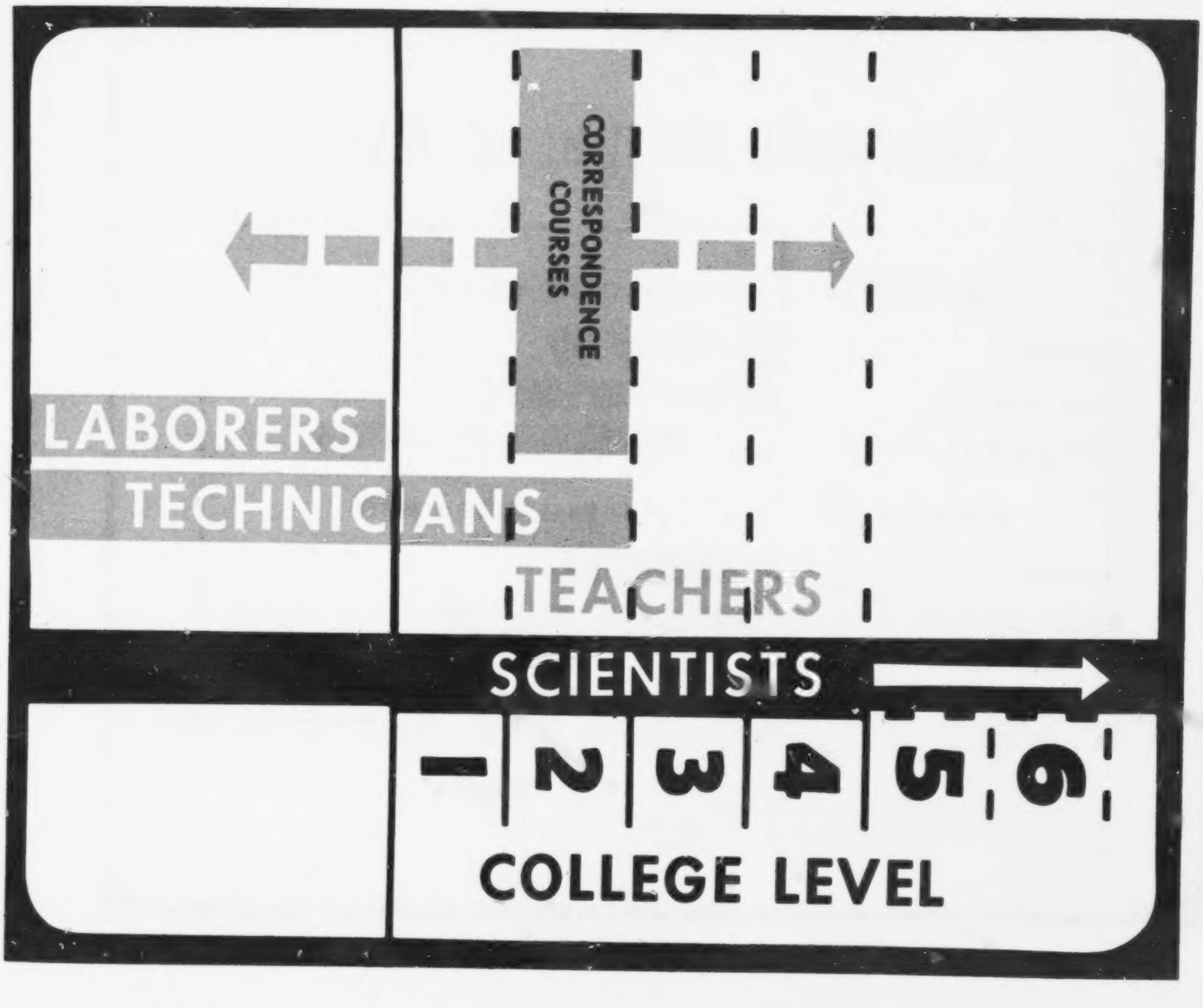


be used beneath the acetate roll so that player positions and assignments can be quickly sketched. A turn of the roll brings a clean surface for follow-up problems. Silhouette cut-outs and transparent plastic forms representing players' positions in a given sport can be quickly and effectively manipulated. Body positions for exercises may also be presented in sequence by use of overlays.

Wherever still visuals are appropriate, properly applied overhead projection techniques can be depended upon to provide efficient learning results.

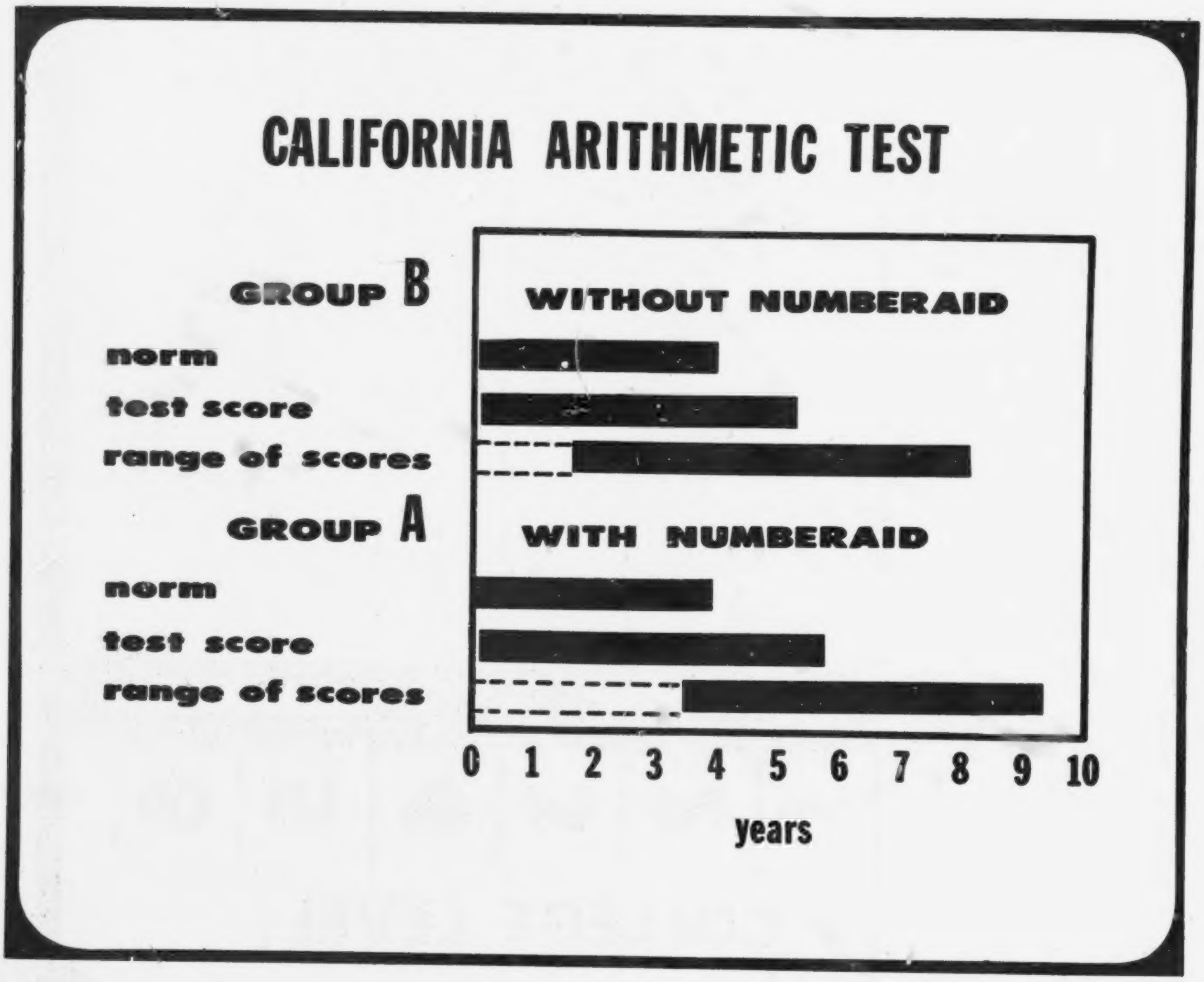
A Look at College Teaching

More and more college instructors are accepting and using the overhead projector as a basic communication tool. Its flexibility, its ease of operation, and its developmental characteristics are as valuable at this level as in the examples above. In fact, overhead techniques are particularly helpful in the presentation of complex or technical concepts.



College teaching requires an abundance of graphic materials in presenting research summaries, basic theory and compiled fact. Where conventional types of charts, graphs, posters and pictures fail because of small size or other limitations, overhead materials prove most satisfactory. Overlays and special slides have been used successfully in the teaching of mechanical drawing, bookkeeping, accounting, engineering, education, agriculture, political science, speech, and many other content areas.

One engineering professor developed approximately 400 traffic engineering transparencies for use in undergraduate and graduate courses, conferences and speaking engagements. Some 25 institutions have purchased a selected set of 225 traffic engineering transparencies which were made available to other colleges and universities. In commenting on the importance of overhead projection, this engineering professor states, "One of the transparencies has seven moving parts and is in three colors which permits for the first time the mathematical solution of the progressive timing of traffic signals before a large audience."



PROBLEM
SOLVING
CONCEPTS
COMPUTATION

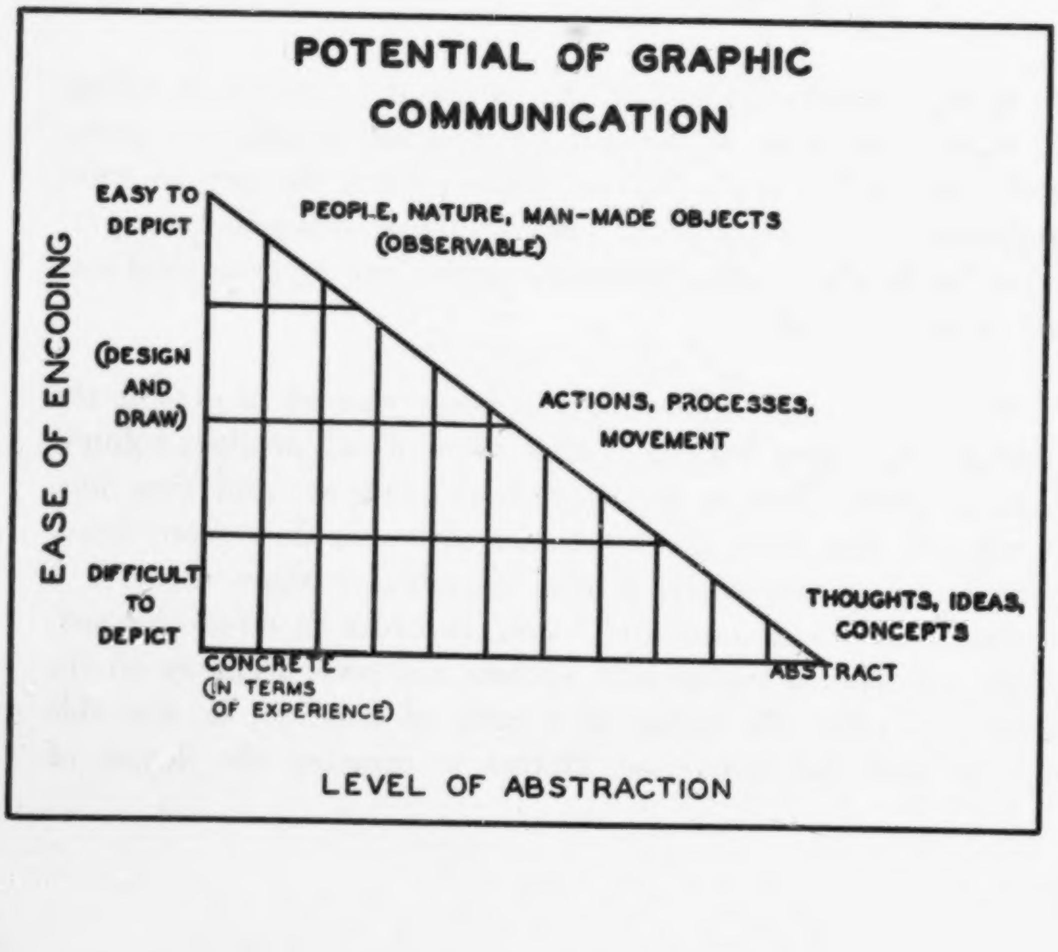
A chief reason for use of the overhead projector in college teaching is that many factors can be presented visually to a group at one time and that overlay techniques permit the user to make immediate visual comparisons. The professor, being his own projectionist, develops the presentation at the best psychological rate and in his own way.

For example, an engineering professor wanted to present the fundamental characteristics of traffic flow which involves volume, density, speed, distance headway, time headway, and time loss. It was felt that these characteristics of traffic flow were interrelated and consequently, it was desirable to show them in a developmental and composite form. In order to do so the professor constructed a map with volume and time headway on the horizontal scale. By means of a series of overlays, he was able to deal with the remaining factors in showing the degree of traffic congestion on three lanes of an expressway. The professor felt that this single overlay transparency, representing 50,000 observations of each of the six variables, was by far the clearest and most concise manner in which these inter-relationships could be shown.

Another instructor, teaching a beginning poultry course, said, "In an effort to revitalize the course, an overhead projector was added to the list of visual resources. It proved to be of such value that its use has continued to expand. It is now being used approximately 50 per cent of the time in the beginning poultry course and is gaining acceptance in several of the more advanced courses."

Most college professors, who truly try the overhead projector, seem to appreciate it most because it provides one of the best means of presenting a number of different types of information in a logical straight-forward manner. Variety is introduced by interspersing transparencies, overlays and time exposures. It is the one projection tool that he can work at his own rate in his own way.

College and adult materials may be custom made to fit unique and difficult problem areas. Overhead techniques will bring comparable satisfaction to instructors in each of the disciplines and will provide ways and means for tabulating research findings and new data for presentation to groups. They will vitalize a lecture, encourage discussion, and in general heighten interest. Such use can only result in greater learning and more meaningful communication.


POTENTIAL OF GRAPHIC COMMUNICATION
EASE OF ENCODING
EASY TO DEPICT
(DESIGN AND DRAW)
DIFFICULT TO DEPICT
PEOPLE, NATURE, MAN-MADE OBJECTS (OBSERVABLE)
ACTIONS, PROCESSES, MOVEMENT
THOUGHTS, IDEAS, CONCEPTS
CONCRETE (IN TERMS OF EXPERIENCE)
ABSTRACT
LEVEL OF ABSTRACTION

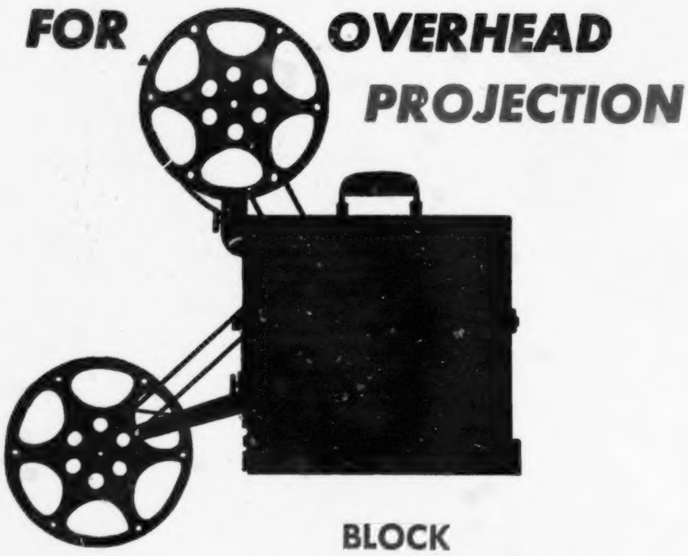
making transparencies for overhead projection

CHAPTER 5

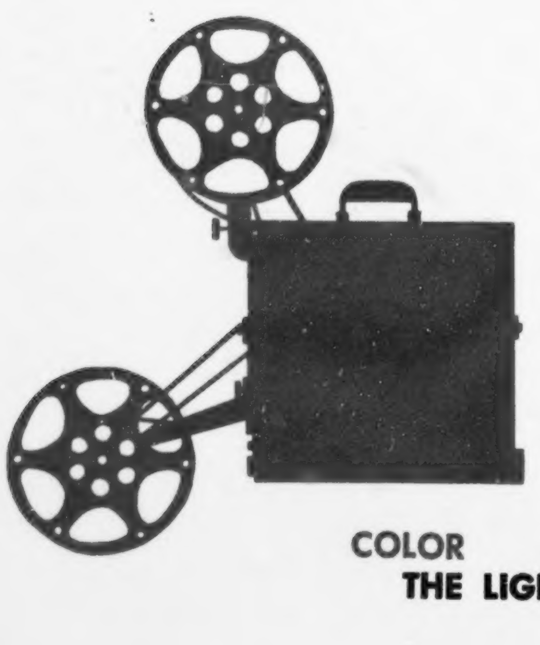
PRODUCING OVERHEAD TRANSPARENCIES

To thoroughly understand the versatility of the overhead projector is to prepare many of your own transparencies. A little interest and "know-how" in graphic construction and a willingness to try will guarantee satisfactory transparencies from the beginning. You do not have to be a graphic specialist or an artist, because there are numerous graphic aids that may be used to provide a degree of professionalism in lettering and drawing. Much material only needs to be traced and transferred to transparent sheets.

Before reviewing the basic techniques for preparing transparencies, a brief treatment will be given to how images are created. This understanding will assist, not only in creating images for preparing transparencies but also in the preparation of slides for other types of projections.



BLOCK
THE LIGHT



COLOR
THE LIGHT

Creating Images

Images for overhead projection are created by controlling the light that passes through the stage of the projector. Light may be blocked, colored or polarized to produce the desired shapes, forms and effects. The nature of the learning problem should determine the combination of light control techniques to be used in preparing a transparency.

Blocking the Light

Blocking the light occurs when any opaque substance is used in the preparation of the transparency. The opaque portions of the transparency shut out the light to produce silhouette images, or dark surfaces, on the screen. Opaque materials in stick, liquid or solid form may be applied by writing, printing, drawing, or cutting and arranging. Grease pencils, water paint, construction paper, special carbons, pressure sensitive materials and small 3-d objects work well.

Coloring the Light

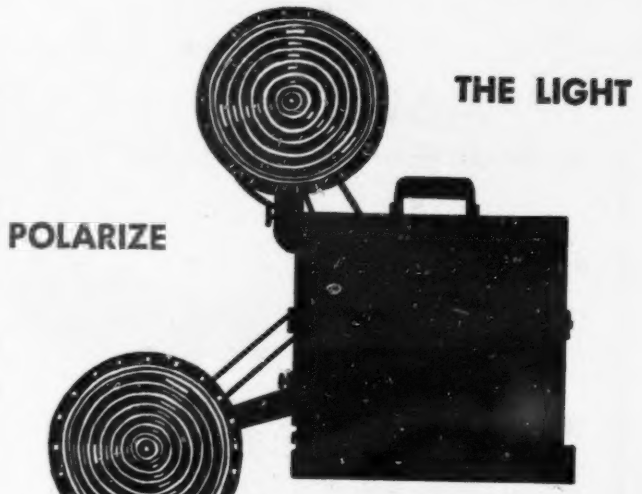
Color may be added to transparencies (1) by application of transparent color directly or (2) by a chemical process. To control the light by color requires the selection of materials that are transparent and that will project true. Types of materials for coloring light are (1) chemically treated acetate foils, (2) special liquid chemicals, (3) colored paints and inks, (4) colored pencils on frosted surfaces and (5) colored transparent materials such as cellophane, acetate, glass and plastic. Most transparent materials will provide color when projected, but it is wise to test each to be sure that no color change or distortion occurs when projected.

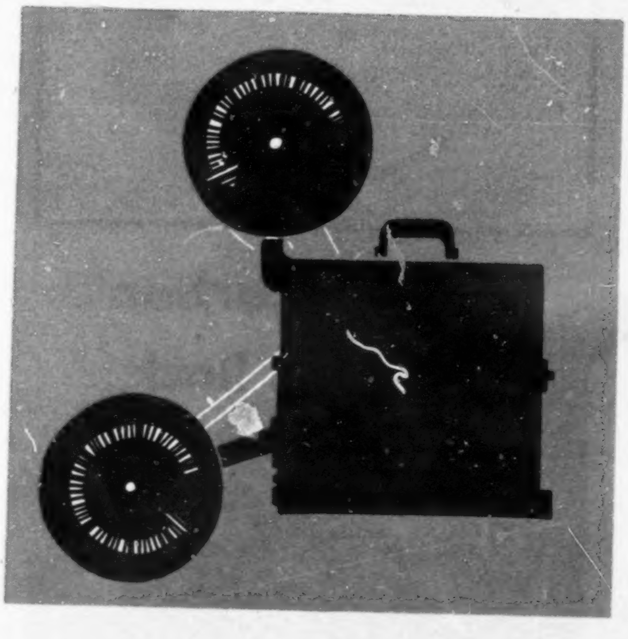
A variety of pressure sensitive transparent and semi-transparent materials in many shapes and patterns may be applied directly to transparent sheets to provide color. Check with your audio-visual dealer for information regarding the source of these and other types of materials now being manufactured for your use.

The effectiveness of color from special inks, liquid water paints and pencils greatly depends on the type of transparent materials chosen for use. Colored inks and liquid water colors must be of a sticky base in order to adhere to smooth acetate sheets. Colored pencils require a rough, or etched, surface sufficient to pull lead marks from the pencil point. The rough surface is referred to by artists as "tooth." It takes more tooth for colored pencils than for water paints and inks. Multiple color can be added to a single transparent sheet by using these direct application techniques.

Polarizing the Light

By using technimation materials on the surface of a transparency and by projecting the transparency through a motorized polarizing disk mounted between the lens and stage of the overhead projector, motion can be added to the projection. Technimation materials have creased lines that tend to break the rays of light that pass through the stage of the projector. As the rays of light pass through the technimation material and travel through the revolving polarized disk, the rays are broken sufficiently to cause motion to appear on the screen. This type of light control produces such action as reversing, rotating, blinking, radiation and turbulence. Reverse action may be obtained by using birefringent materials applied over the technimation materials in the transparency. To add color, pressure sensitized color foils may be used to cover the technimation materials.





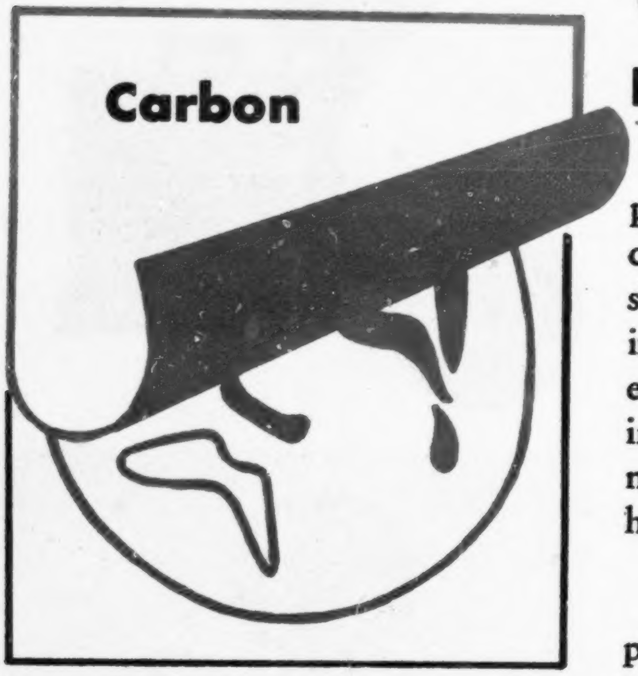
COMBINE TWO OR ALL THREE
FOR SPECIAL PURPOSE

Making Transparencies

TECHNIQUES

DIRECT DIAZO
POLARIZED

MATERIALS



Carbon
Back
Film

Several "how-to-do-it" publications are now available to give assistance in preparing transparencies for overhead projection. Probably the most thorough treatment appears in an Indiana University publication entitled A GUIDE FOR USE WITH THE INDIANA UNIVERSITY FILM SERIES IN THE AREA OF PREPARATION AND USE OF AUDIO-VISUAL INSTRUCTIONAL MATERIALS. Users of overhead projectors would benefit by having available a copy of this publication.

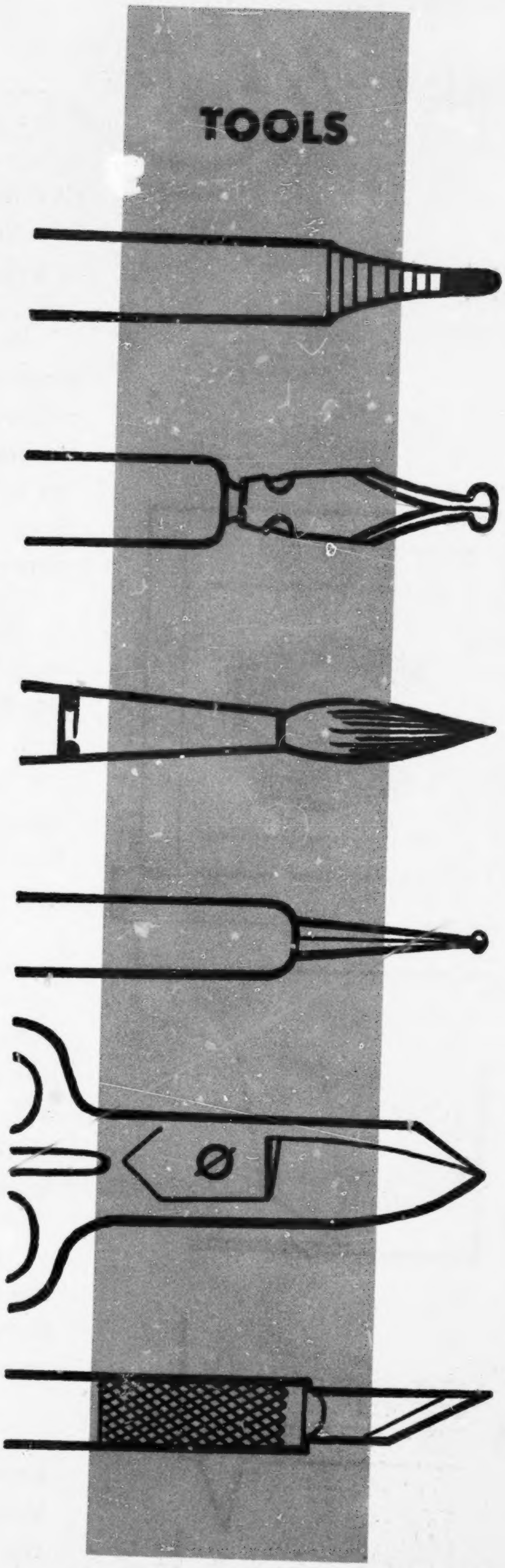
The following discussion on preparing transparencies for overhead projection is not an attempt to present an exhaustive treatment but rather to organize and to explain a few of the more common. In order to prevent repetition and to show relationships, the techniques are presented as follows: (1) direct application, (2) Diazo transfer and (3) polarized technimation.

Direct Application

Direct application refers to the preparation of a transparent sheet for immediate projection. This includes (1) carbon film for typing images on to cellophane or plastic sheets, (2) carbon coated plastic for producing reversal images in typewritten or drawn form and (3) clear and etched acetate for receiving direct application of pencil, ink, water paint and pressure sensitive material. Slides made using these techniques are frequently referred to as hand-made transparencies.

TYPEWRITTEN TRANSPARENCIES are made from cellophane sheets and red carbon paper. Special typing guides, purchased commercially, may be used to add speed and accuracy in preparation. To prevent slipping in the typewriter carriage, cellophane sheets may be stapled to the red carbon paper. Place the stapled cellophane carbon sheets in the typewriter carriage; set the type to stencil; adjust the type pressure to prevent cutting through the carbon paper; and proceed to type the desired information. After completing the typed information, discard the red carbon and mount the typed cellophane in a specially prepared frame. Heavy acetate sheets can be used to sandwich the finished transparency and protect it from damage.

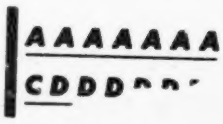
If large lettering, drawings, or directional lines are desired, they may be made by using a stylus or sharp, hard lead pencil. Rulers, templates, or circular based objects may be used in assuring smoother drawn lines.



Carbon coated plastics are handled in a manner similar to that described in preparing a typewritten slide. The carbon coat on a plastic base can be removed by typing or by pressure from a stylus or hard lead pencil. When projected, the black surface gives a reversal effect of white light against a black screen. By placing a sheet, carbon side up, over the stage of the overhead projector you can draw or write on the carbon surface with a stylus or pencil and have the image appear instantly on the screen. To make a carbon coated typewritten slide, place the film, carbon side down, between two sheets of onion skin paper. Use a backing sheet to give support, and proceed to type as directed in making a cellophane carbon slide.

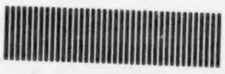
More complex images may be transferred to carbon coated plastic by the DOT DUSTING TECHNIQUE. First make a tracing or drawing on a sheet of transluscent architect's paper and, second, proceed to punch a series of small holes through the outline of the drawing. This will provide you with a stencil that can be placed against the carbon side of the film to receive dust from an eraser. By gently tapping the eraser against the porous stencil, the outline will be transferred to the carbon film. After dusting, remove the stencil and proceed to trace the chalk outline by means of a stylus or sharp, hard lead pencil.

FROSTED ACETATE sheets may be used for tracing or drawing images for direct projection. To prepare frosted acetate transparencies, trace directly onto the etched surface. Light outlines may be formed with a hard lead pencil and filled in later with soft lead pencils or inks.



ARTYPE
CRAFTYPE

ZIPATONE
CRAFTONE

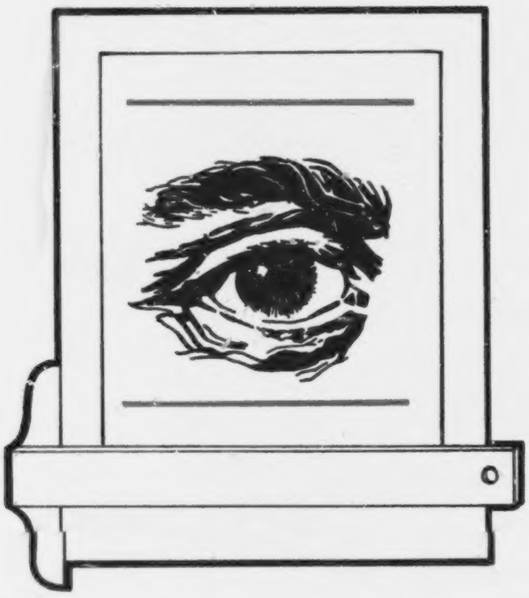


TECHNAMATION

CHART PAK

SYMBOLS

Color may be added by applying transparent water paint, special non wax crayons, indelible pencils, or transparent pressure sensitive acetate. Cover the developed transparency with a clear sheet of acetate before mounting. Clear acetate plates may be prepared in a similar manner for the use of special crayons and pencils.

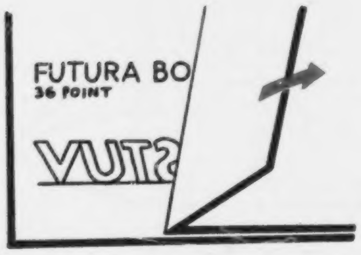


Pressure sensitive refers to the use of transparent or opaque materials that are backed with an adhering base that holds when pressed against cellophane, acetate or paper. These materials may be used with other direct materials previously described to add variety to handmade transparencies. Pressure sensitive alphabets, lines, shapes and patterns do much to add a professional quality to transparencies.

To prepare a transparency from pressure sensitive materials, first, lay out your basic graphic on the surface of a sheet of drawing paper; second, place a clear acetate sheet over the drawing; and, third, proceed to match the pressure sensitive materials to the original drawing. After matching and trimming the pressure sensitive material, rub the surface with a plastic or metal instrument that has a round or smooth base. Thorough rubbing removes all bubbles and eliminates color and pattern distortion.

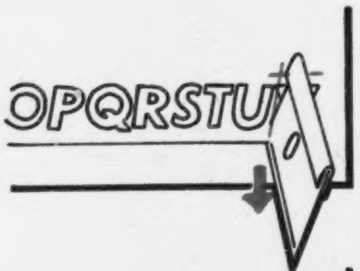
Lettering can be easily set when commercially prepared adhesive backed alphabets, such as Artype or Craftype, are used. Before arranging the type, the master drawing should be fastened to a drawing board with thumb tacks or masking tape. By using a T square place very light guidelines to indicate the position of the bottom edge of the letters on the master copy. After this has been done, proceed in the following manner:

1



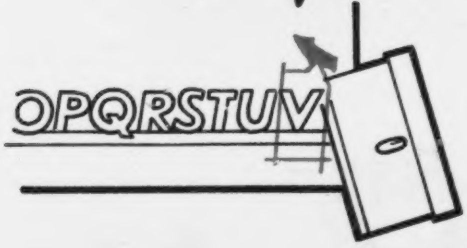
1. Estimate the length of space available on the master drawing and select the alphabet style and size that is most appropriate. General design and continuity, as well as available space, should govern your choice.

2



2. Place the sheet of lettering, face up, on a piece of wood or heavy cardboard. With a single-edge razor blade or cutting knife, cut around each letter being careful not to go through the backing sheet. If making a diazo master, it is only necessary to cut out the letter in rectangular form being careful to include the section of the horizontal guideline directly below the letter.

3



3. With the point of the cutting instrument, carefully lift cut out letter from the backing sheet and carry it to the typesetting area on the tip of the knife.

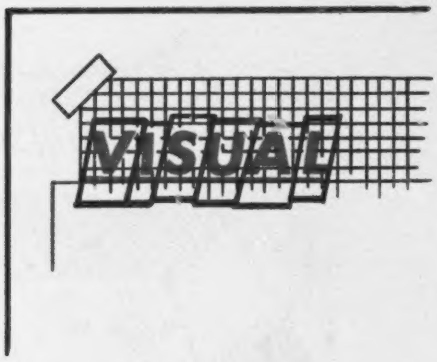
4. Tape a piece of ⅛ inch graph paper to a rigid surface. Lay a sheet of engineering tracing paper on top of the graph paper with one edge flush with the horizontal lines. Starting at the left side, set the gummed back letters carefully in position, making sure that the thin black guidelines below the letter coincide with the top edge of the tracing paper and with the vertical and diagonal lines of the graph paper. Make sure that the bottom edge of each individual letter is securely fastened to the top edge of the tracing paper. THE AREAS BETWEEN THE LETTERS (NOT THE DISTANCES) SHOULD APPEAR to be equal.

5. Lift the entire word, phrase or sentence from the graph paper to the master drawing.

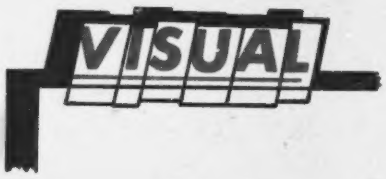
6. Lay the tracing sheet, with its attached lettering, on top of the master drawing and position it on the lightly drawn guidelines so that the top edge of the tracing paper coincides with the guideline. Using the bowl of an ordinary teaspoon, or any hard blunt instrument, slowly rub the letters down to the master drawing until they are smoothly and firmly attached.

7. Carefully separate the letters from the supporting sheet by cutting so that the black outline is left on the supporting sheet.

8. Check the finished master for balance, letter position, cleanliness and opacity.



4



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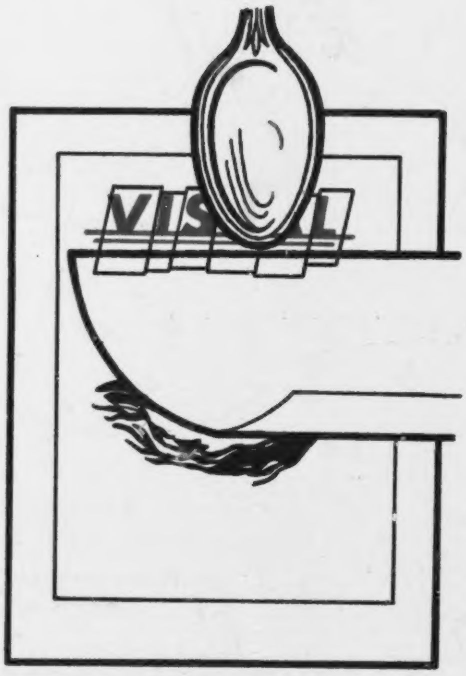

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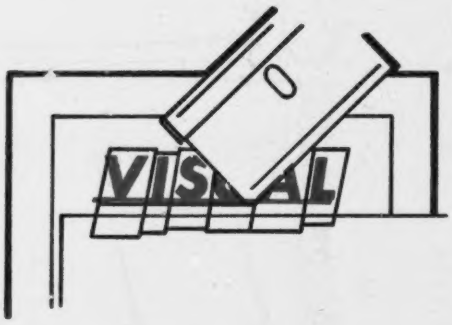

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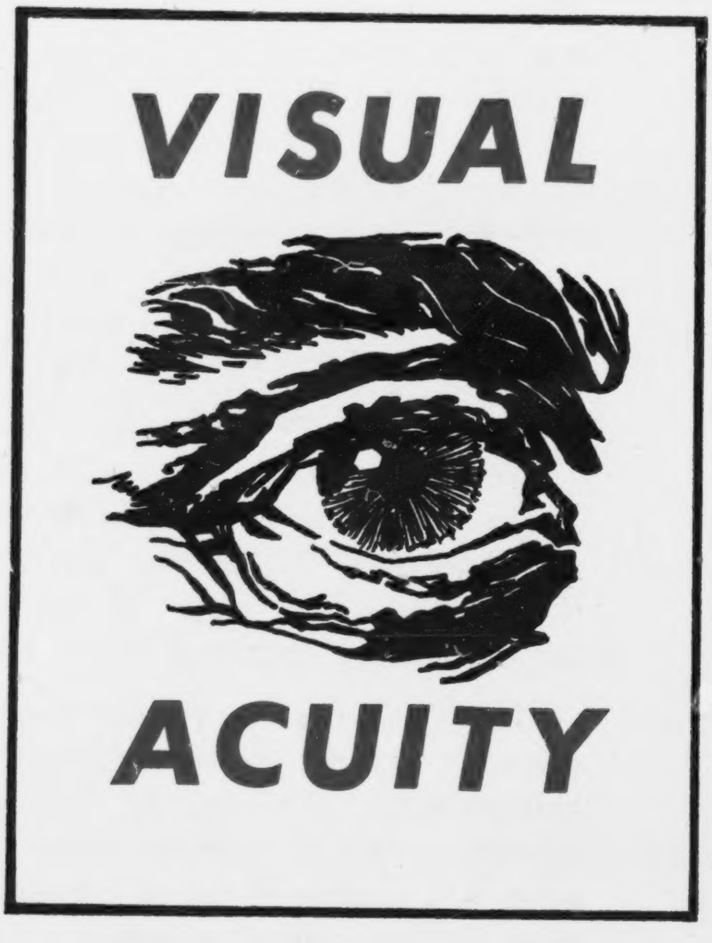

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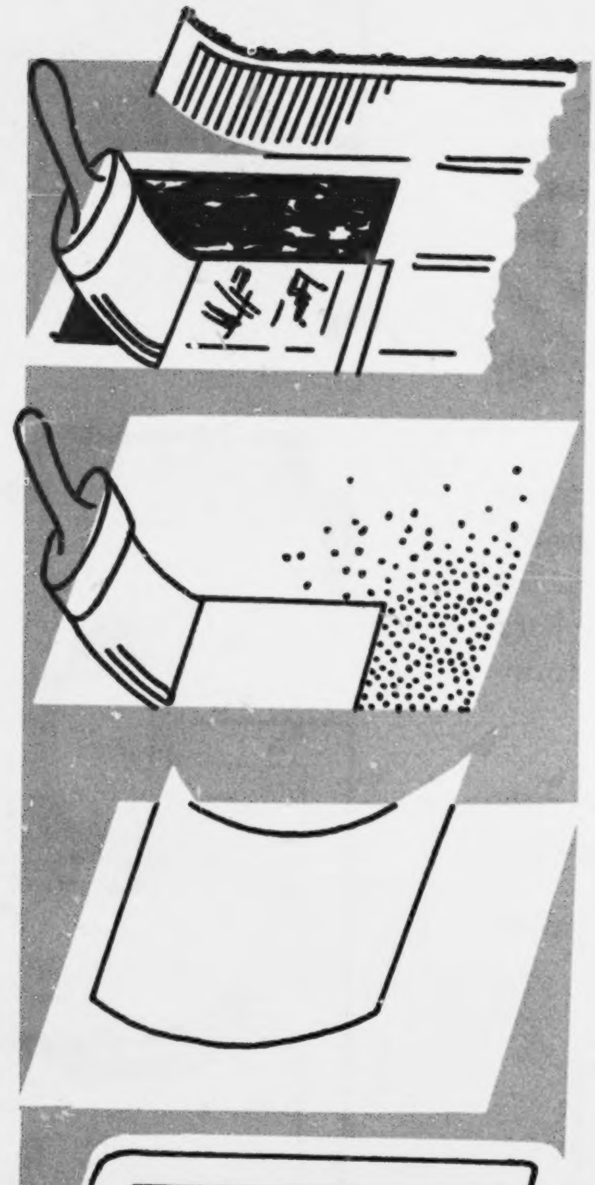


Picture transfer refers to a process of direct lifting of printed materials. Any clay coated printed page may be transferred to acetate by applying rubber cement to the surface of the printed page and to one surface of the acetate. After coating these surfaces and pressing them together, the print from the page will transfer to the acetate sheet.

To prepare a transparency by the picture transfer technique, you should select the picture to be transferred and gather the necessary materials to complete the job. Before applying rubber cement, slightly rub the clear acetate with steel wool (or select frosted acetate) to guarantee sufficient tooth for holding the cement. Now coat the surface of the picture and the acetate sheet with cement making sure that the application on each surface is even and of sufficient quantity to prevent the necessity of going back over coated portions.

Bend the acetate sheet so that you center the crease at the middle portion of the picture to be copied and work from the center outward to eliminate air pockets that may develop. Rub both vertically and horizontally to make firm contact.

After thoroughly rubbing the two surfaces, place the material in cold water and allow it to soak 15 or 20 minutes or until such time that you can gently pull the paper from the acetate surface. Proper soaking will eventually allow the paper to be freely pulled from the acetate leaving the image deposited. After removing the paper, gently wash the cloudy substances from the acetate sheet. In washing, you must be careful not to disturb the deposited image that has been absorbed by the thin layer of rubber cement.

There are cellophane and acetate materials with a pressure sensitive base that make the lift without going through the rubber cement application. Check your school supply or audio-visual dealer for information regarding this material.

Illustrating is frequently needed to make the necessary master for direct, Diazo, or polarized transparencies. The field of mass printed media provides a host of excellent ideas. The following steps will suggest ways of copying illustrations from existing printed materials.

1. Select an appropriate illustration from a book, magazine, or newspaper and lay a sheet of engineering tracing paper on top of it. Lightly trace the outlines of each area with a soft lead pencil.

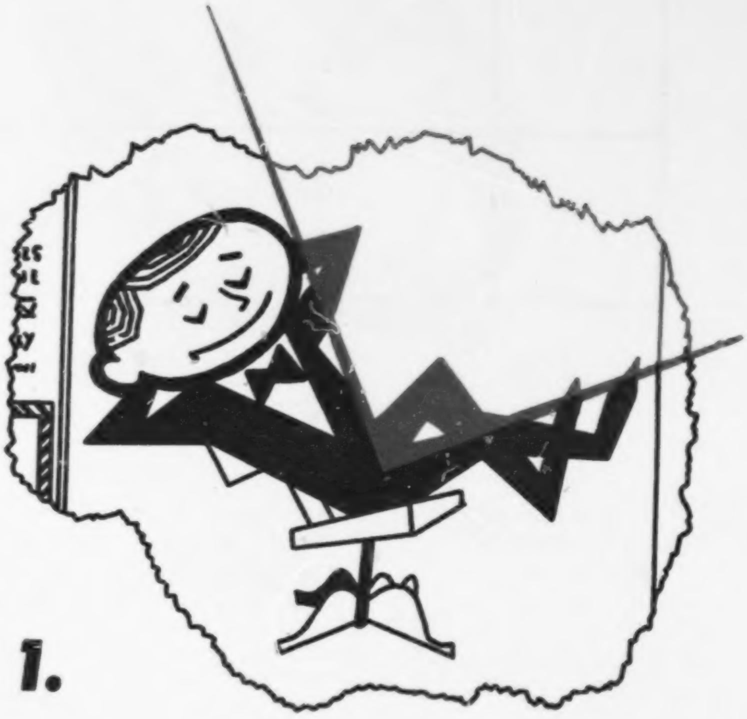
2. With a ruler and sharp pencil draw a grid of small squares on top of the tracing.

3. Carefully draw a larger grid with the same number of squares in each direction as in the original drawing; the total dimensions of the second grid should fit the transparency area desired. As accurately as possible, duplicate the small drawing, square for square, into the spaces of the larger grid. Be careful to place lines in the same relative sector of each square and to weight them proportionately. Finally, fill in the solid lines to see exactly what the enlarged drawing will look like.

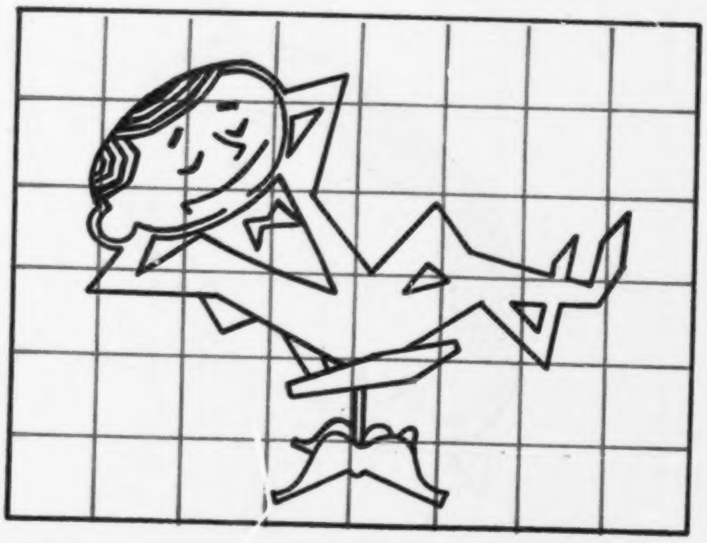
4. When the enlarged drawing is complete, turn the tracing paper face down on a clean white paper sheet and carefully trace over all of the outlines with a soft pencil. This creates a carbon paper which cannot smudge since there is no carbon except where it is to transfer to the final transparency master.

5. Carefully position the tracing upon transluscent tracing paper, tracing cloth or mylar layout. With considerable pressure from a hard sharp pencil, slowly and smoothly go over all of the outlines, transferring the image from the working enlargement to the transparency master.

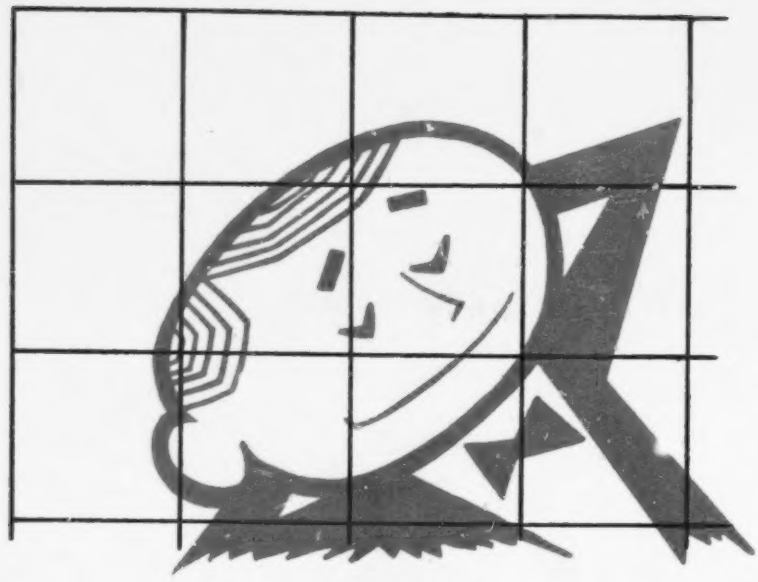
6. After completing the tracing, remove the tracing sheet. If a diazo master is desired, fill in the outlines of the drawing with black India ink and drawing pen or with a fine camel's hair brush. If a direct transparency is to be made, lay a sheet of clear acetate over the master and color in the areas with appropriate pencils or acetate ink.



1.



2.



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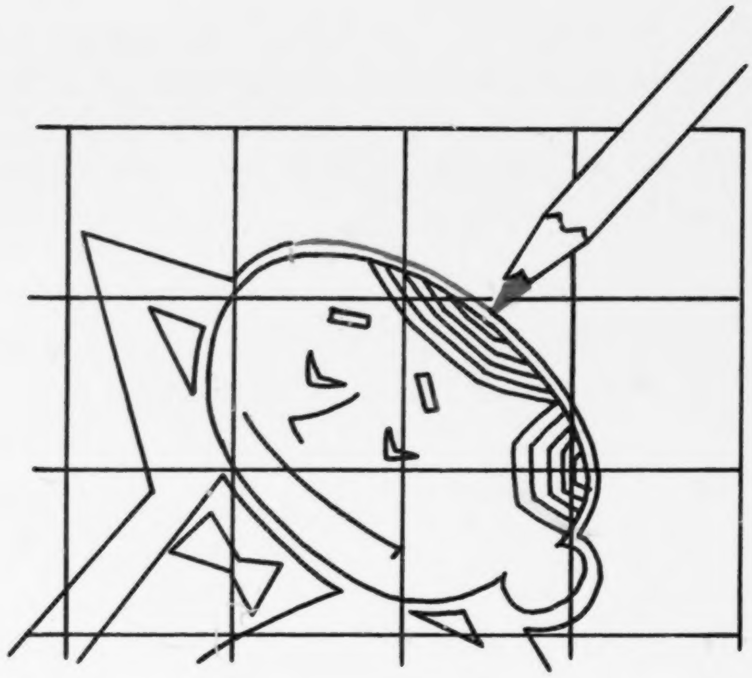

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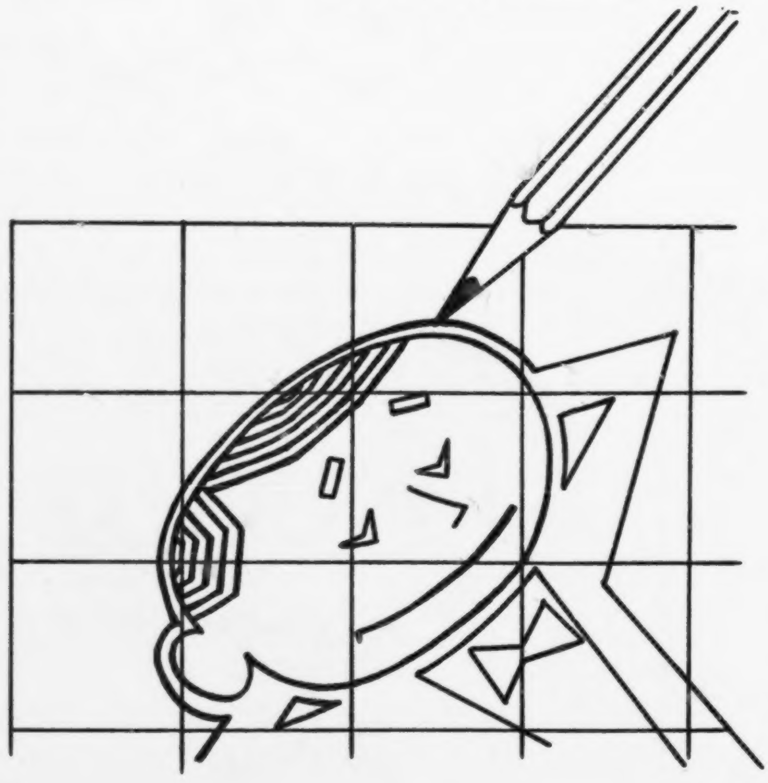

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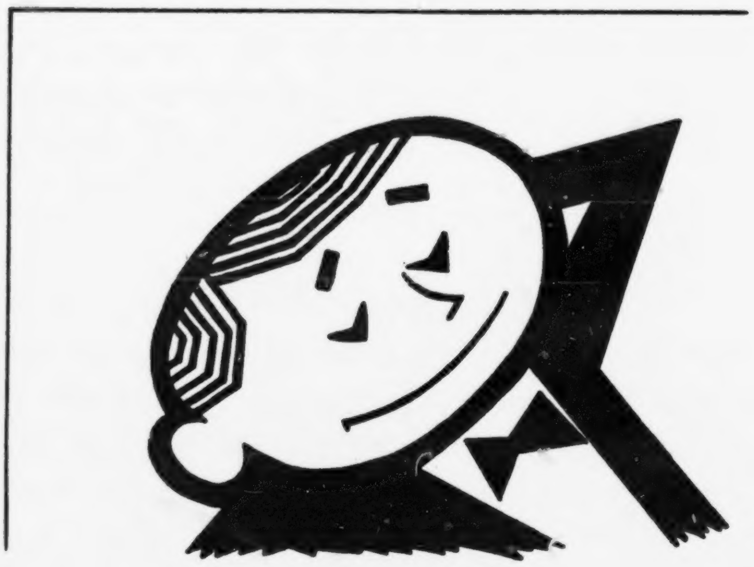

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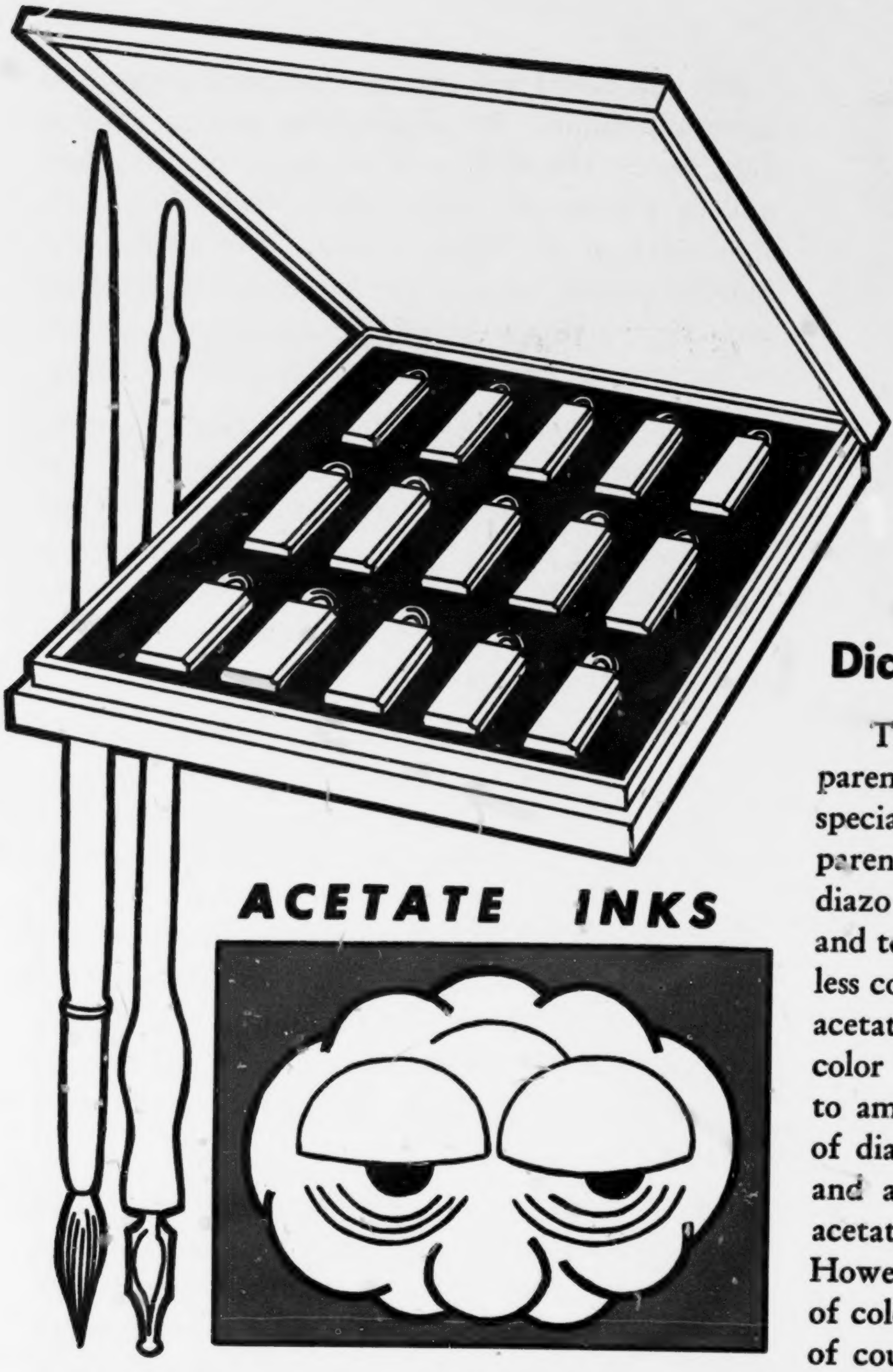
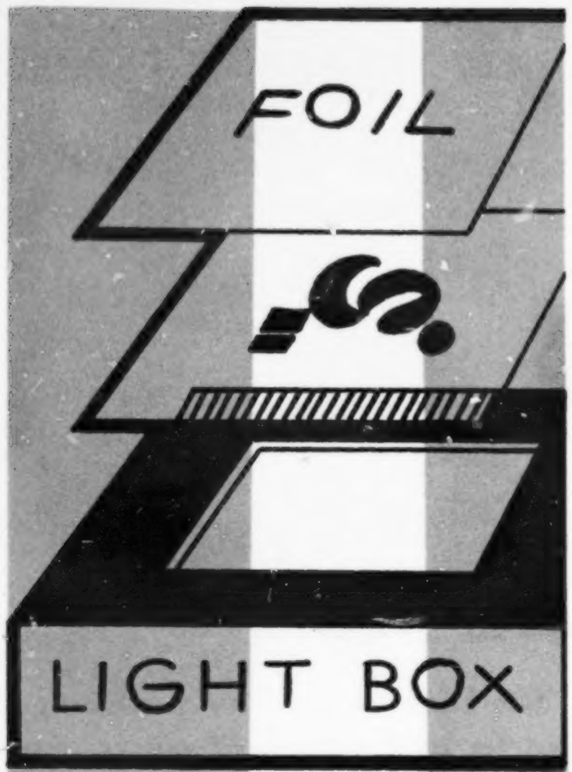


Diazo Transfer

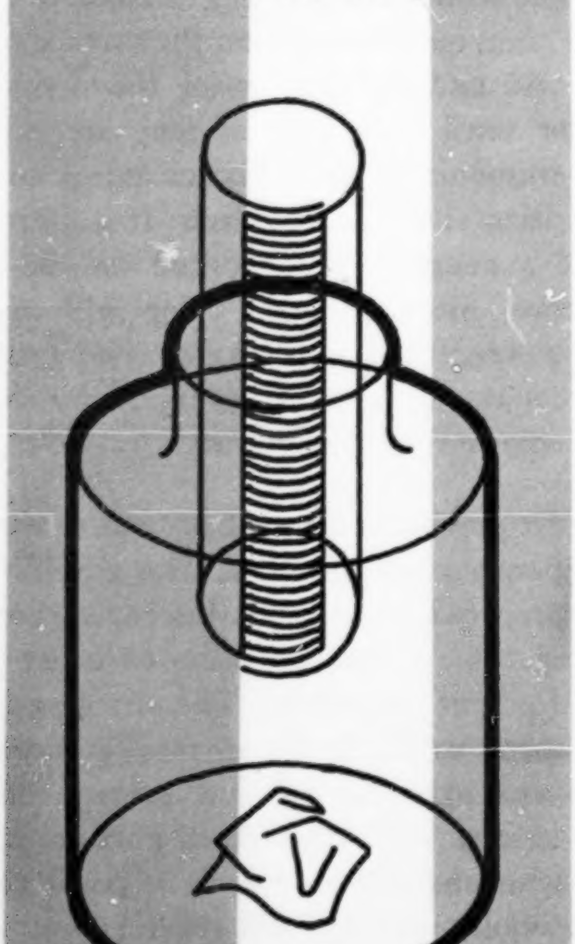
The Diazo process for producing transparencies in a variety of colors requires a special foil and a master graphic. The transparent sheets are chemically treated with diazo salts that respond to ultraviolet light and to ammonia fumes. The salts are colorless compounds coated on the surface of the acetate and do not reveal the designated color until such time as they are exposed to ammonia fumes. The chemical consists of diazo salts and couplers. If a diazo salt and a coupler are deposited on the same acetate sheet, a single color will appear. However, if only a salt is deposited a variety of colors may be made to appear by the use of couplers after exposure.

In making a diazo slide, you must first prepare a master graphic. This graphic may be prepared on any transluscent surface by using inks, paints, cut outs or other nontransparent materials. The drawing must be made to block the ultraviolet rays and prevent exposure to that portion of the diazo salts. All unprotected portions of the transluscent master will be exposed to the ultraviolet rays and will remain clear when exposed to ammonia fumes.

After preparing the master graphic, select the desired color from a package of diazo foil. Each package will be labeled for



EXPOSURE TO ULTRAVIOLET LIGHT



DEVELOPING IN AMMONIA FUMES

color. All colors will appear clear until exposed to ammonia fumes. By placing the master graphic face up on the surface of a special printing box and by placing the chemically coated side (emulsion side) of the diazo sensitive film against the master, a firm contact can be made. A printing box cover is usually provided to guarantee proper contact to prevent light leakage into the drawing.

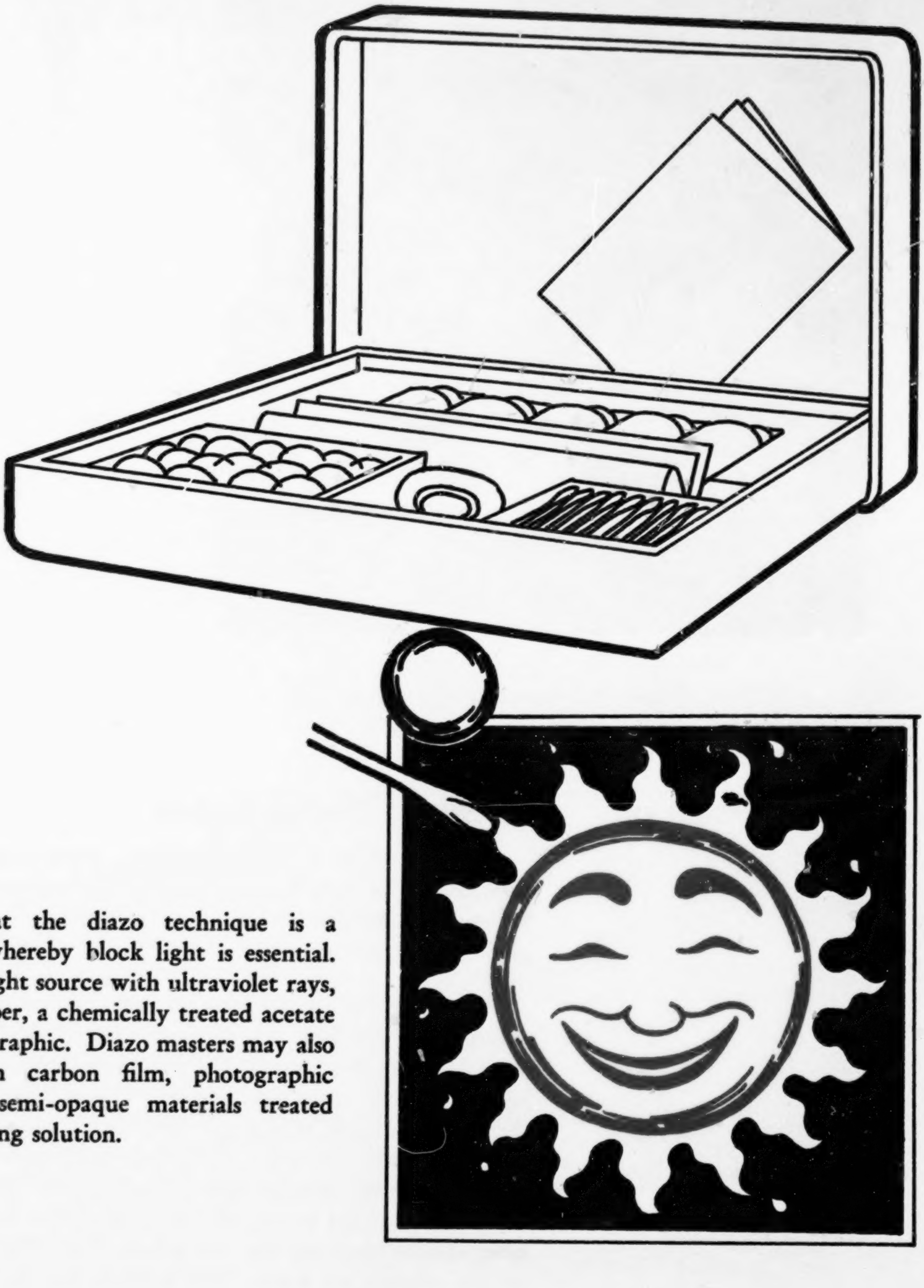
After exposure in the printing box, place the diazo sensitive film in an ammonia chamber so that the unprotected portions of the film will clear and the protected portions of the film will form the color chosen. When the image is formed, remove the film from the ammonia chamber and proceed to mount the transparency.

Although the sun is a source of ultraviolet light and could be used to expose the foils, special lamps are much more reliable when arranged in a printing box or rotary machine. The box and the machine provide correct exposure and control. For example, the ozalid machine has an exposure chamber and an ammonia chamber. By use of belts the master and the foil travel through the light path for exposure. Then the master is removed and the foil continues its path through the ammonia chamber.

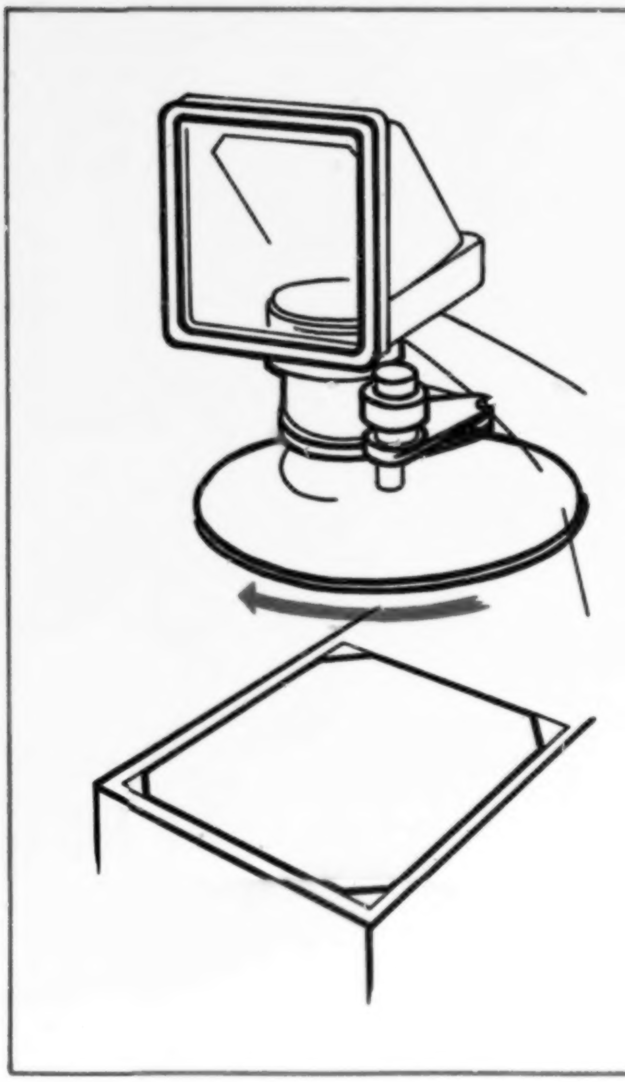
When using a printing box, a separate ammonia chamber is needed. A specially designed chamber may be purchased or a wide-mouth gallon jar will work satisfactorily. If a jar is used, place a paper towel or blotter to cover the inside base of the jar and apply several drops of concentrated ammonia water (28% to 32%) to the absorbent paper. The ammonia will evaporate to produce a chamber of fumes sufficient to cause the chemical action needed to clear the foils.

If you desire a multi-color transparency by the diazo transfer technique, you will need a separate master for each color. Each drawing must be registered to match. Choose the chemically treated foils in the desired colors and proceed to transfer each of the matched drawings. After transferring, proceed to match the separate transparent sheets and mount them together. If an overlay transparency is desired, hinge each sheet separately.

MULTICOLOR



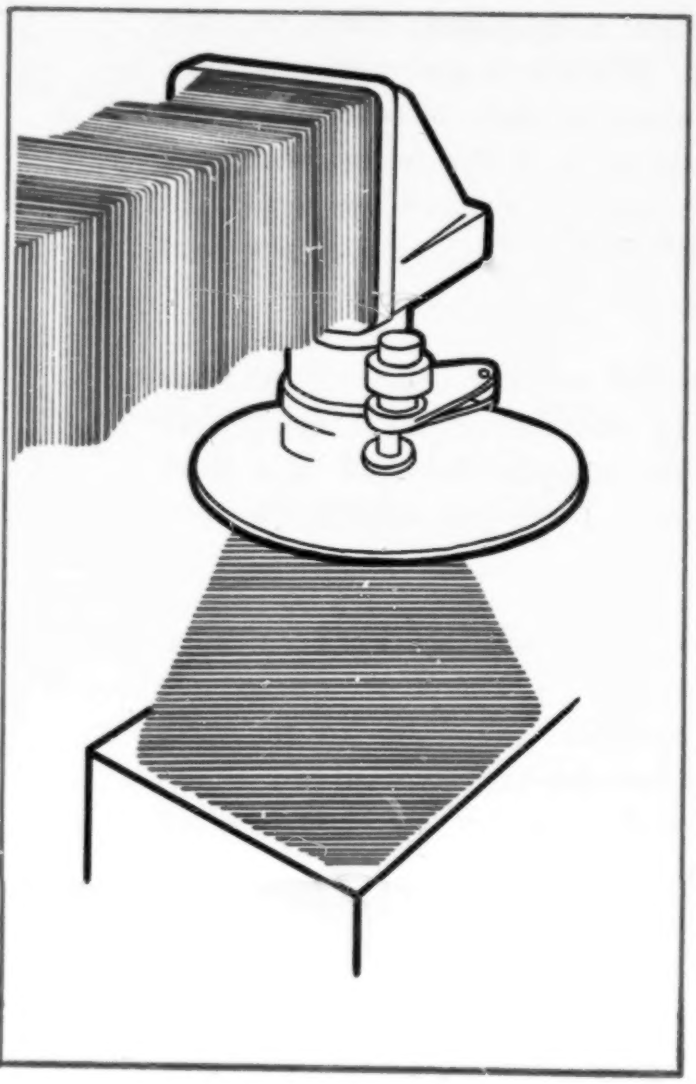
Remember that the diazo technique is a chemical process whereby block light is essential. You must have a light source with ultraviolet rays, an ammonia chamber, a chemically treated acetate film and a master graphic. Diazo masters may also be prepared from carbon film, photographic masters or from semi-opaque materials treated with transparentizing solution.

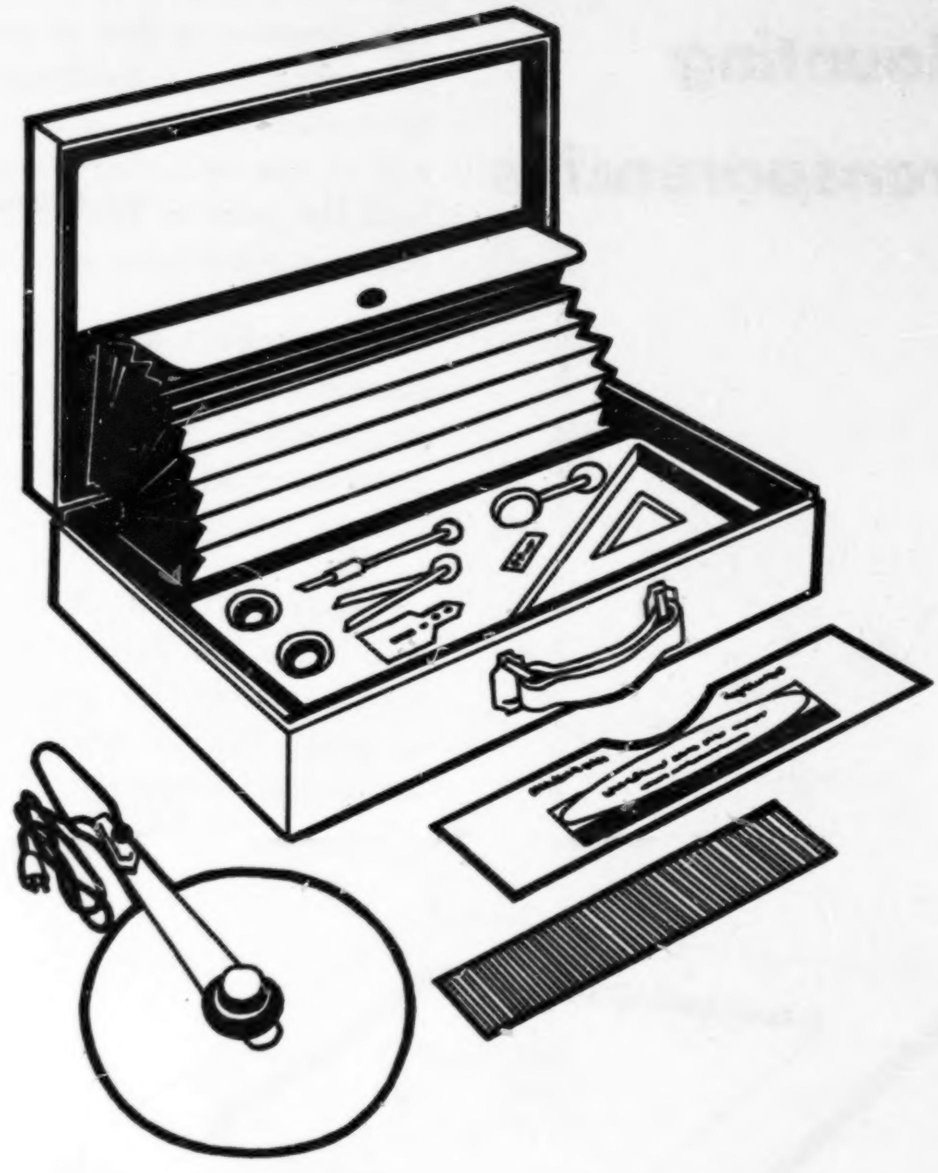


Polarized Technimation

Often transparencies need motion. Animation by technimation, offered by American Optical Company, is a process whereby pressure sensitive technimation materials may be applied to give your transparencies an effect of motion when projected.

Necessary for the construction of a polarized technimation transparency is a basic transparency suited to the materials. The areas in which the motion is to be created should be clearer and lighter than the surrounding areas. This will help to accentuate the movement and to make it unnecessary to trim the edges of the technimation material. If the base transparency is to be made by photographic reproduction techniques, the original art work should be prepared so that the areas which are intended to show clear against black on the transparency are black against white on the original art work. The transparency is then made as a





koderlith-type negative. Carbon film, opaque paper, opaque plastic or acetate patterns may be used to block out the light when polarized technimation action is to be accentuated.

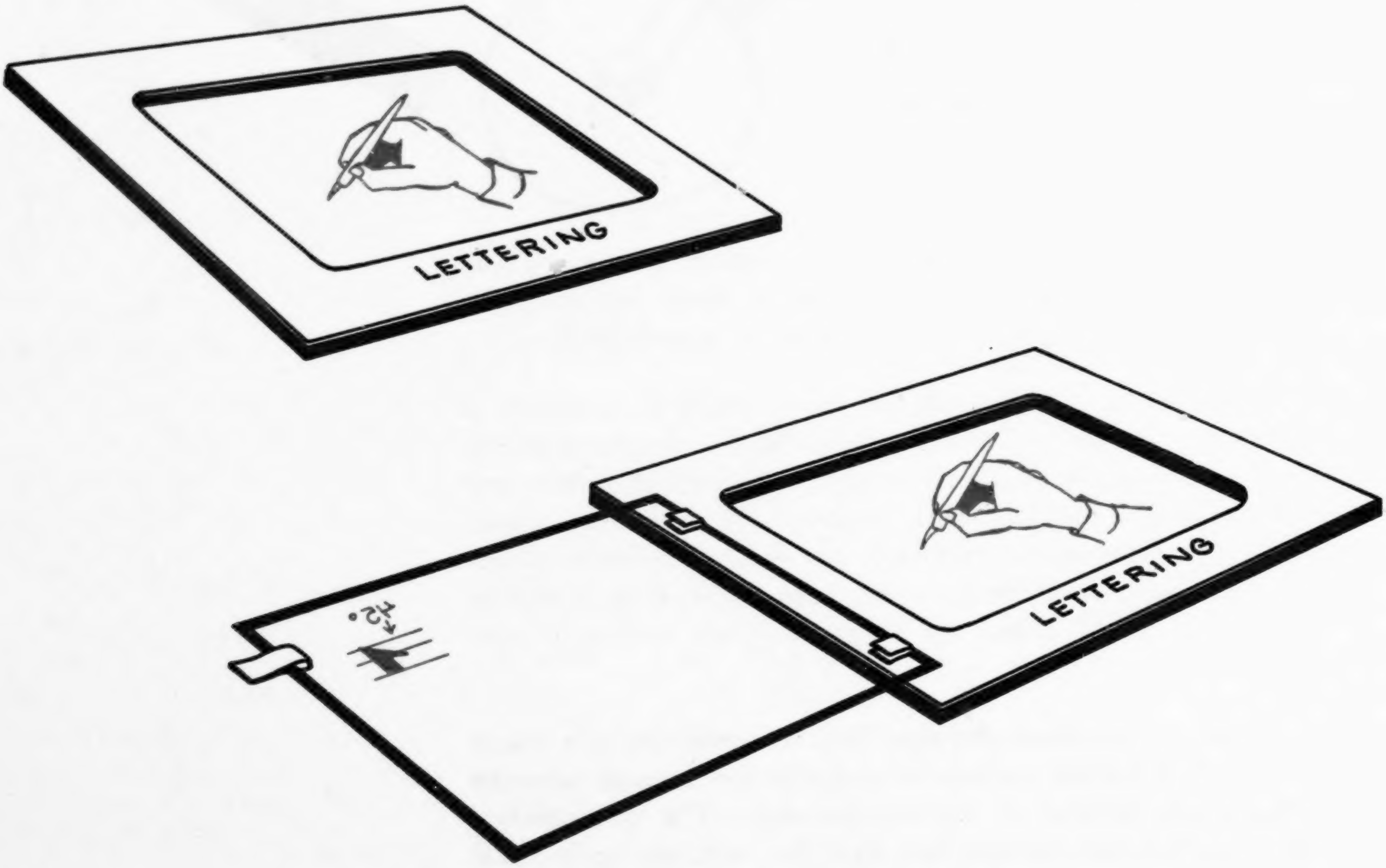
For diazo reproduction, the art work should be prepared as a positive with those areas that are to be clear on the transparency left light on the art work. The clear areas, whether animated or static, can be toned up with pressure sensitive tinting sheets. Where clear areas are not animated, you should use tinting sheets to cut the light transferrence so that the animated areas will be emphasized. Light colors are suggested when animated areas are tinted.

After you have developed your basic transparency, you should work from a lighted surface in applying the pressure sensitive technimation material to the transparency. The transparency should be placed on the light box with the same face up as when it is finally placed on the overhead projector for projection. All technimation tapes are to be applied to the top face of the slide and inspected frequently by viewing through a hand held revolving polarized disk. This will allow you to cut and fit the tape to the areas to be animated and to frequently check to make sure direction or flow is correct. When it is necessary to reverse the animation, a birefringent material, such as cellophane, can be applied over the technimation tapes on the transparency. A roll of non-reflecting pressure sensitive tape may be applied to hold the tapes in position if the adhesive coating does not hold due to repositioning or re-using.

Mounting Transparencies

As has been previously discussed, a great advantage of your overhead projector is the way in which transparent sheets may be mounted. You may want the material mounted in a fixed position, in an overlay position or in a position suitable for continuous movement.

Fixed Position refers to a transparency that has been taped to a frame. To bind such a transparency, choose the proper size frame or mat. If plastic protective covers are to be used, sandwich the art work in position between two plastic sheets and position it over the opening of the mat or frame. Use gummed

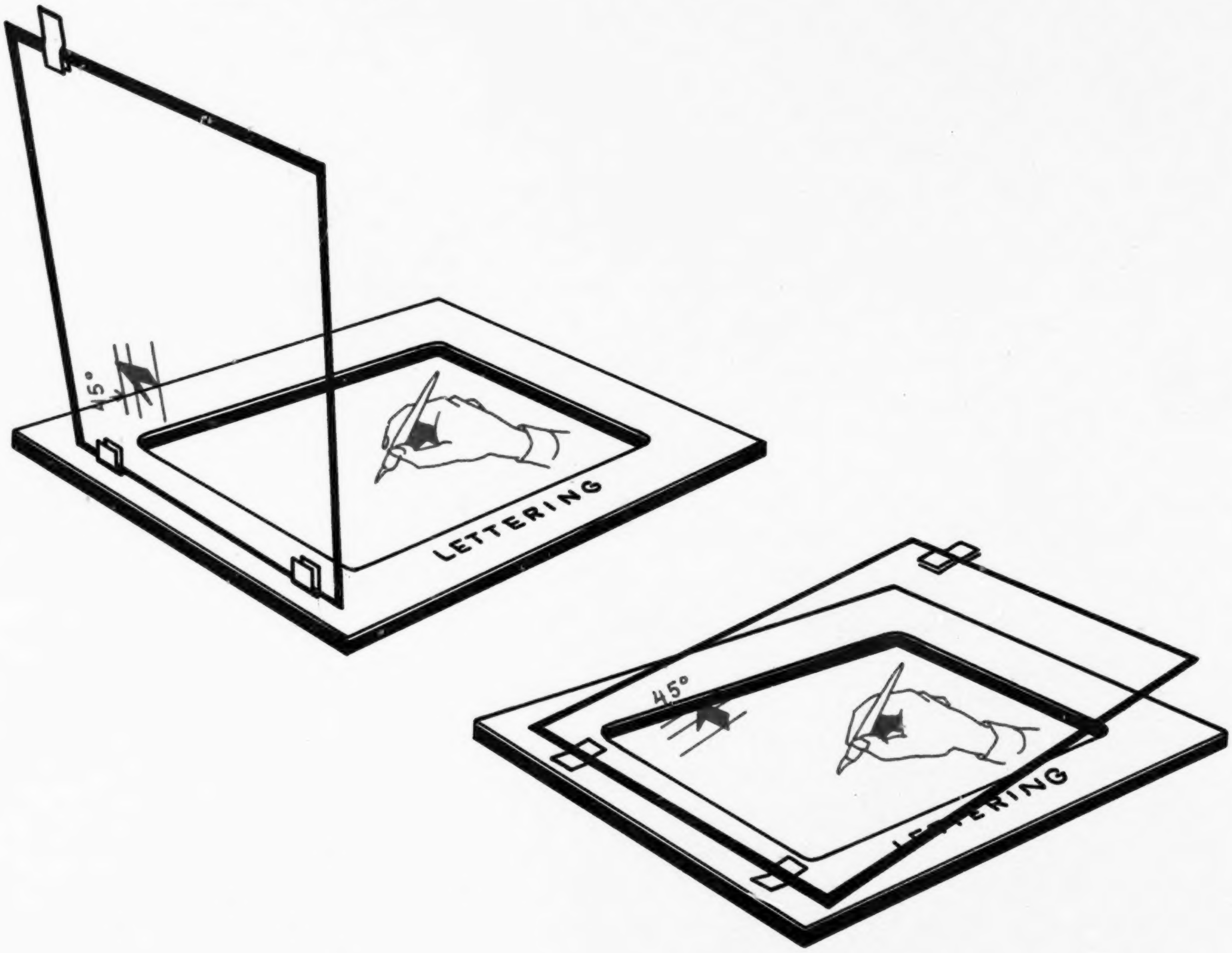


tape to secure the four sides of the transparency to the back side of the mat or frame. Follow the steps shown in binding your own transparencies.

Changed Position includes mounting for overlays, cover lays, sliding and rolling. If numerous transparent sheets are to be used to drop into position, a hinged mounting is needed. The hinge is usually made at the left side of the frame. This arrangement is referred to as an overlay.

The basic transparency should be mounted in fixed position with the additional sheets hinged to register. There is some tendency to hinge overlays from each side of the frame. This technique, however, is cumbersome because it drapes over the side of the projector and is frequently shown to the audience prior to exposure.

Cover Lay is a means of controlling the exposure of a transparency by lifting opaque strips of construction paper or cardboard from portions of the transparency. Cut the opaque strips in shapes needed to cover the transparency and proceed to mount to the frame of the transparency.



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beginning your transparency file

CHAPTER 6

BEGINNING YOUR TRANSPARENCY FILE

By now it should be evident that the overhead projector is most versatile and that an abundance of materials do exist. A transparency file may be started by tracing basic charts, maps and graphs from magazines and text books, or by direct transfer of the printed materials to transparent sheets. Your audio-visual dealer may have transluscent masters that you may copy or he may be able to refer you to college, university and commercial sources that offer transparencies for sale. In either case your audio-visual dealer is a key person in helping you to begin your transparency file.

Frequently, desired materials are either too small or too large to fill the surface of a transparency. When this situation occurs, enlarge or reduce by placing the copy on the platen of an

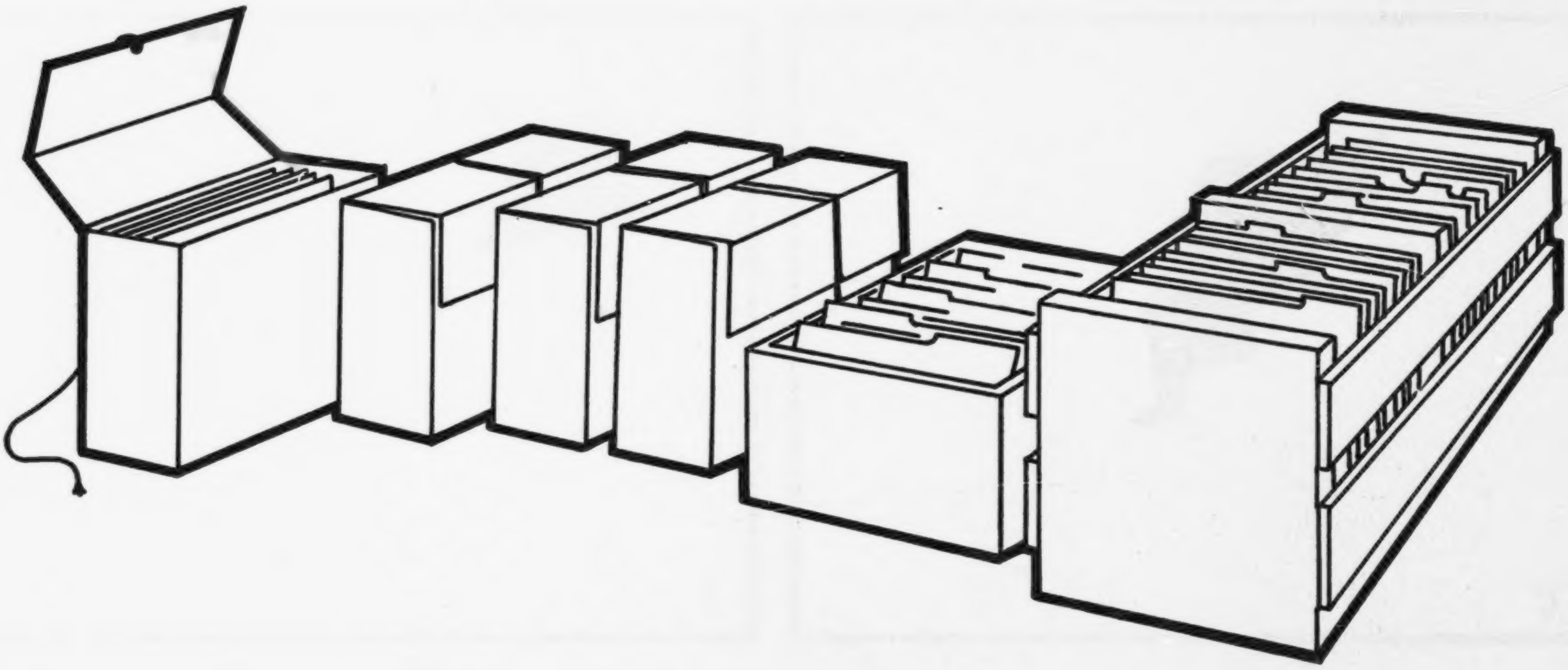
opaque projector and project the image to a flat surface wall. With thumb tacks or masking tape, mount a sheet of tracing paper and a mounting frame over the projected copy. Make sure that the enlargement is the size desired. To reduce the size of the projected image move the projector closer to the wall; to make the image larger move the projector away from the wall. If more reduction is needed, readjust the projection lens by loosening the set screw that holds it in its mount and move the lens closer to the projection surface.

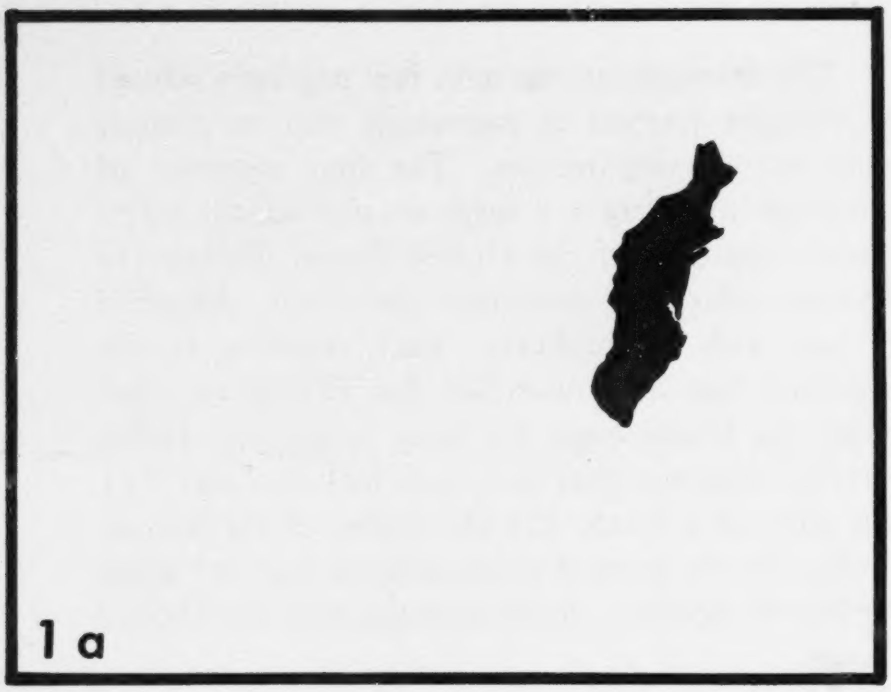
If you wish to make a transparency from materials other than Diazo, mount either frosted acetate, carbon film or cellophane over the projected image. Trace over the projected image with the appropriate graphic tool and fill in the details later.

If you wish to make a master for producing Diazo transparencies, trace the projected image in light pencil outline and ink in with black India ink after the tracing has been removed from the projected surface. When master copy is being prepared for the production of an overlay, remember to trace each drawing in the series on a separate sheet of tracing paper and to keep the opaque projector in a fixed position throughout the sequence.

The drawings on the next few pages are offered as thought starters to encourage you to prepare your own transparencies. The first sequence of drawings make up a 9 sheet overlay on the territorial expansion of the United States. Follow the opaque enlarging procedure previously described if you wish to duplicate. Each drawing in the sequence has been matched for fitting together after the Diazo copy has been produced. Other overlay drawings that have been included are: (1) the parts of a tooth, (2) the organs of the human body, (3) the parts of an automobile and (4) maps of North America, South America and the United States.

As you begin to accumulate transparencies you will want to consider storage and care. It is not necessary to have elaborate and expensive file cabinets. Many home-made facilities work as well. Orange crates from the grocery store provide excellent storage space for a large quantity of transparencies. Cardboard boxes that you can purchase and poster board boxes that you can construct are ideal for keeping transparencies in an organized sequence. Regardless of the storage facility chosen, remember that arrangement and accessibility add pleasure to the selection and use of available transparencies.





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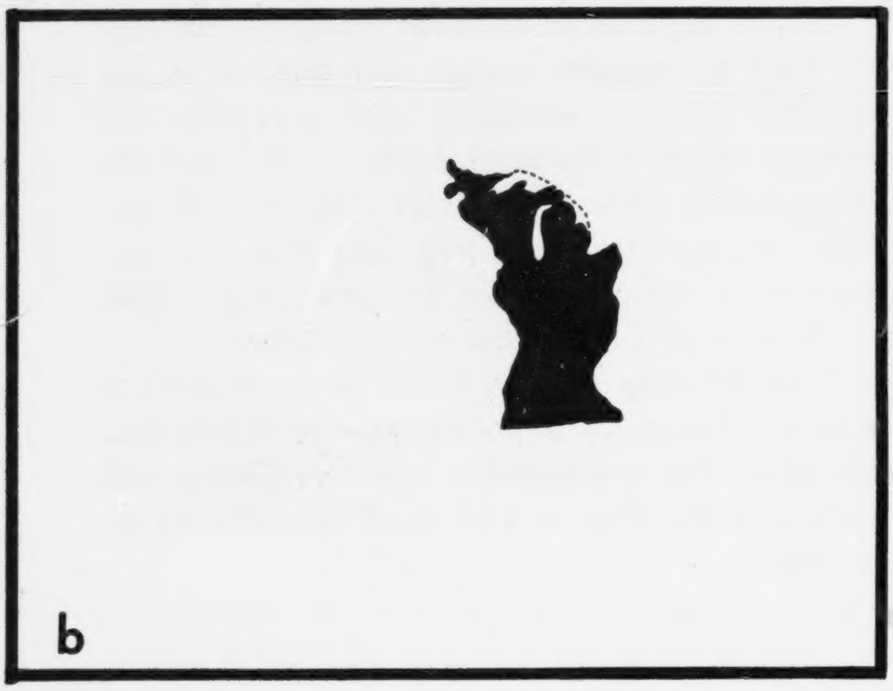

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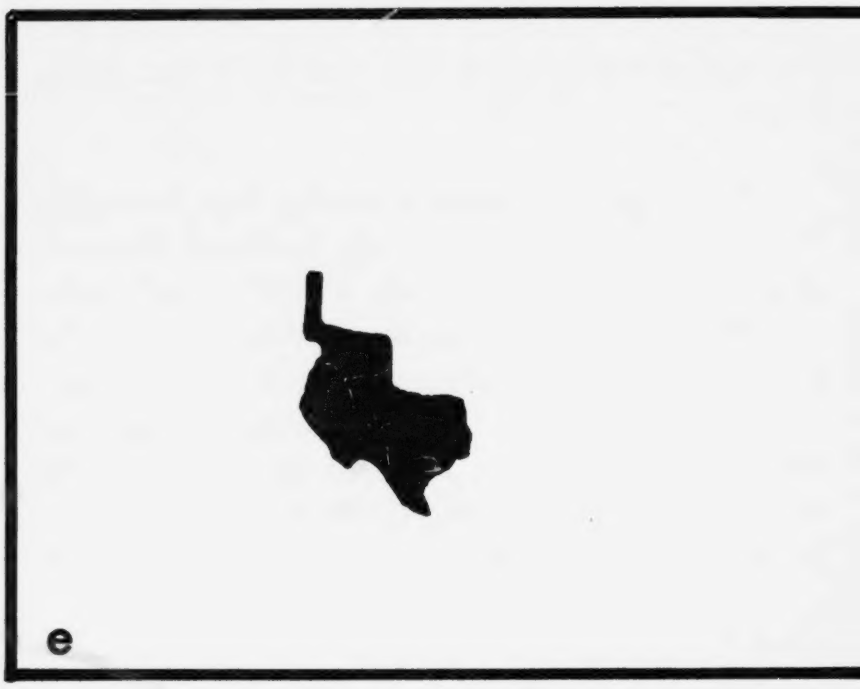

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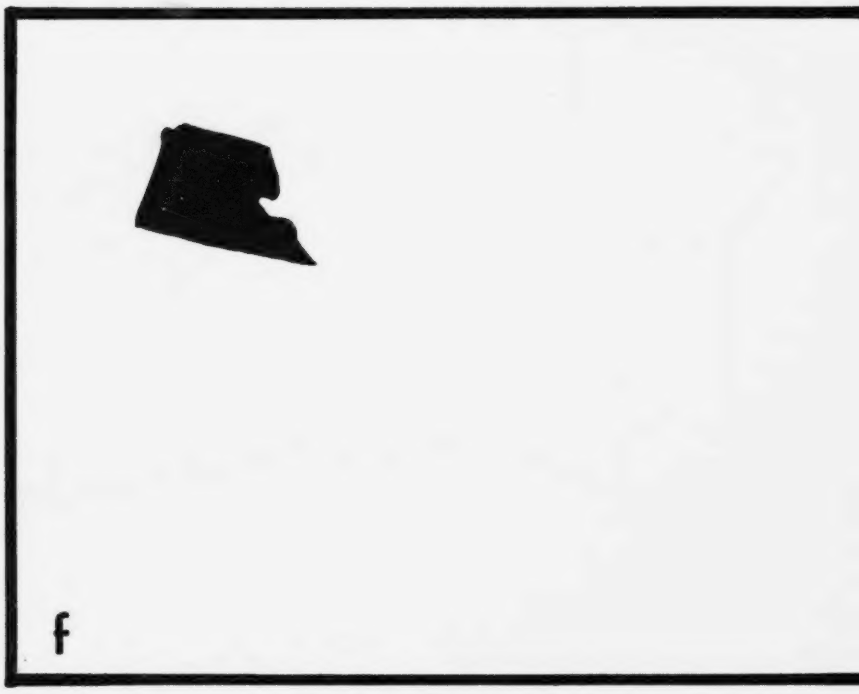

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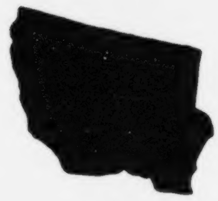

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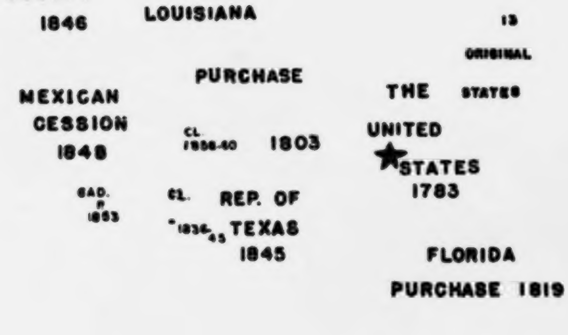
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COUNTY
1846
LOUISIANA
PURCHASE
1803
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ORIGINAL
STATES
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CESSION
1848
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1836-40
THE
UNITED
STATES
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PURCHASE 1819

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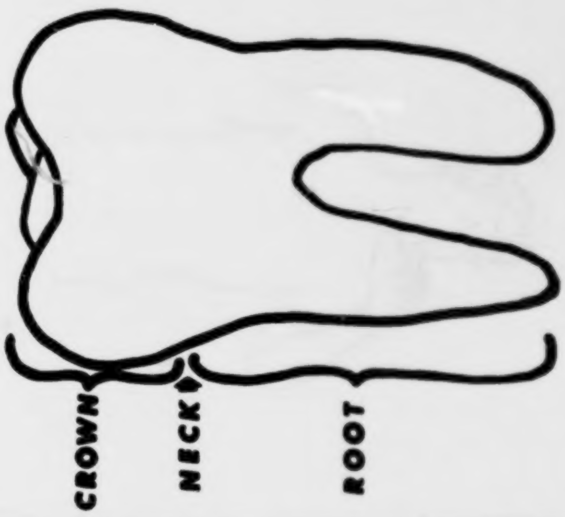
CROWN
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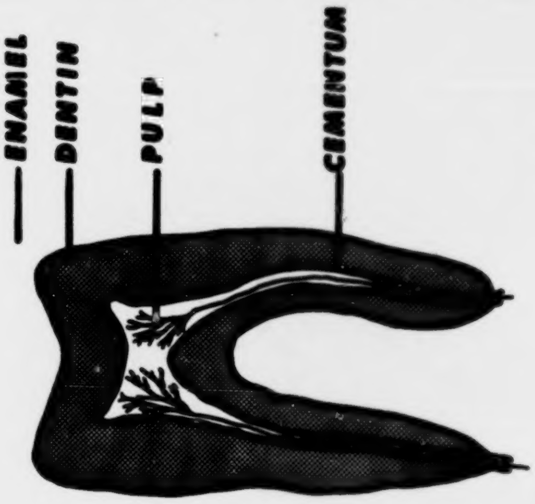
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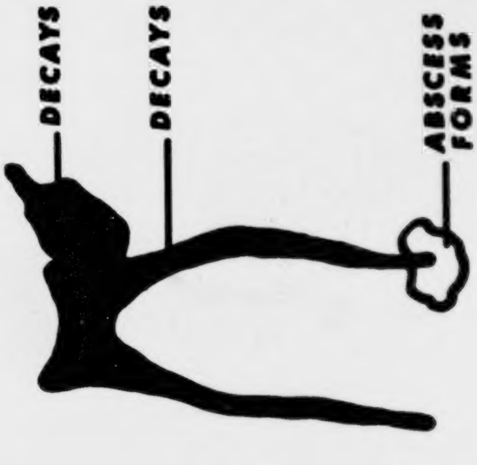
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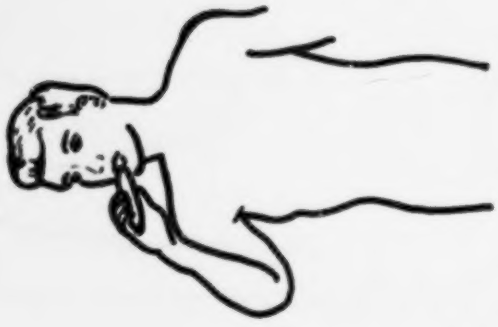

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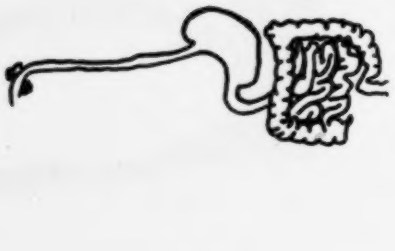

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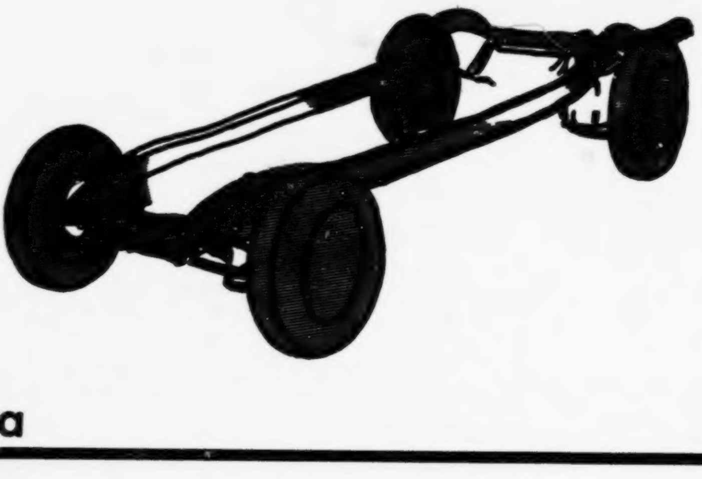

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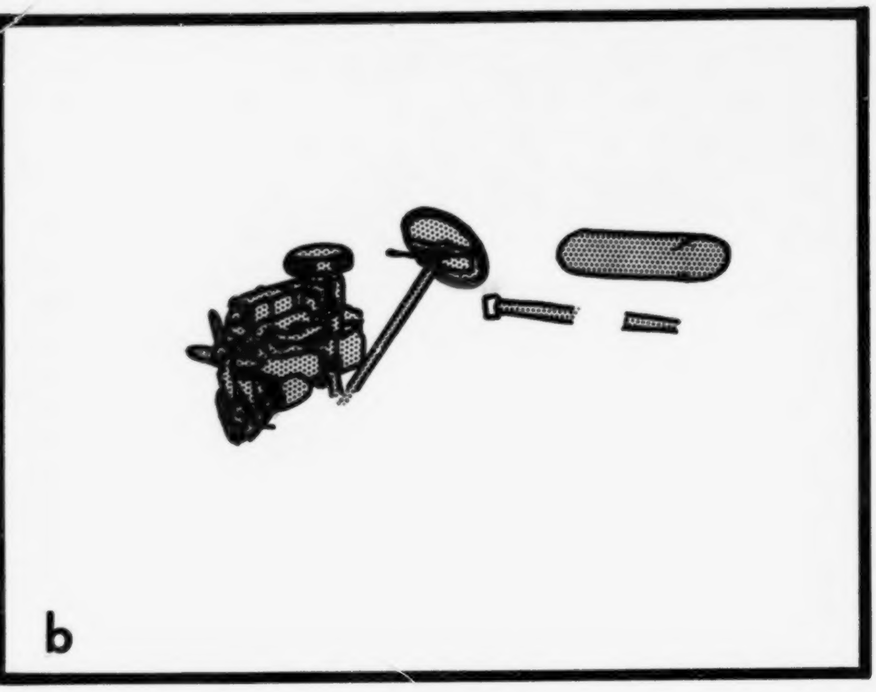

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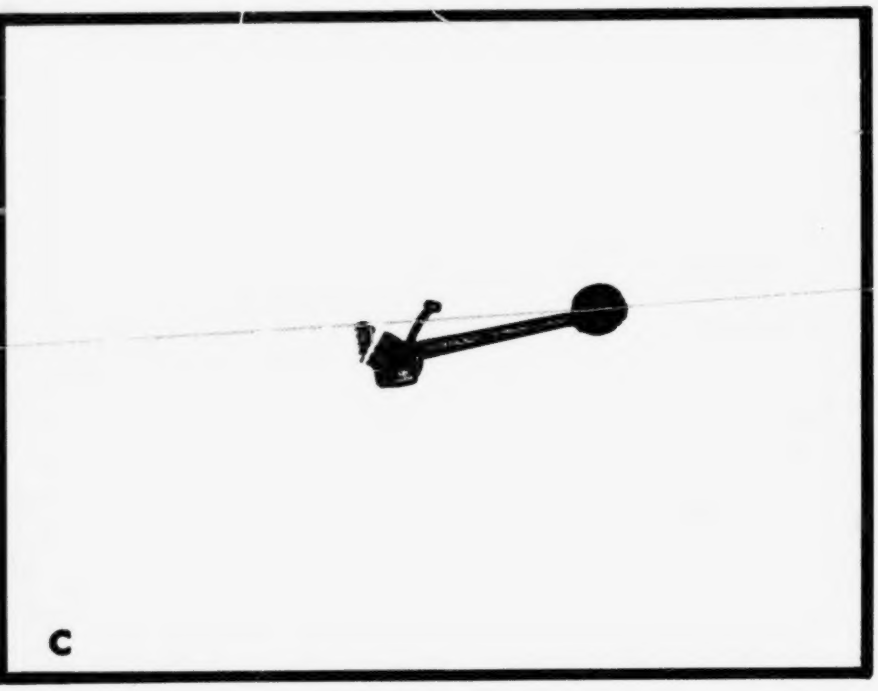

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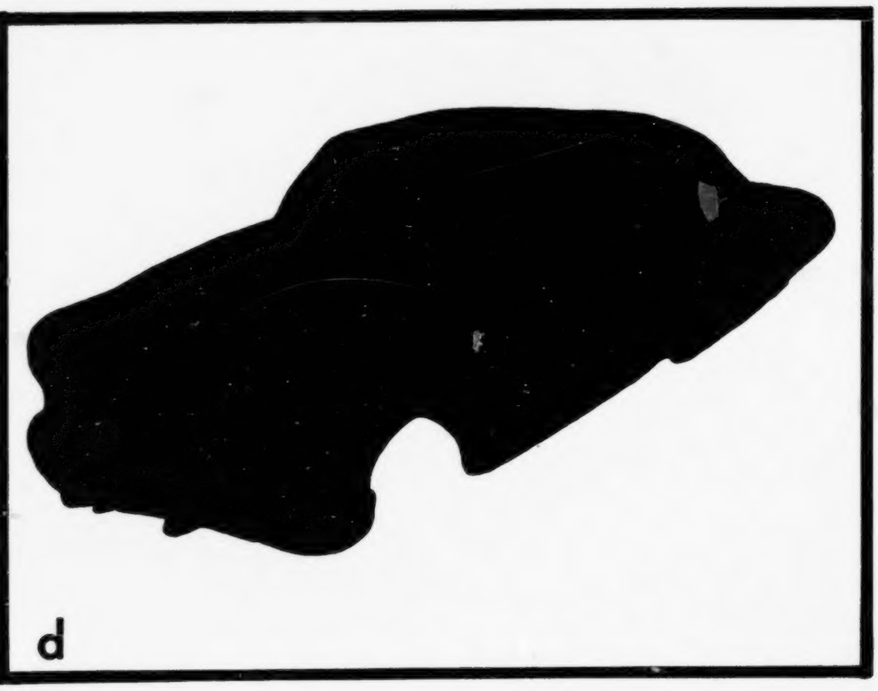

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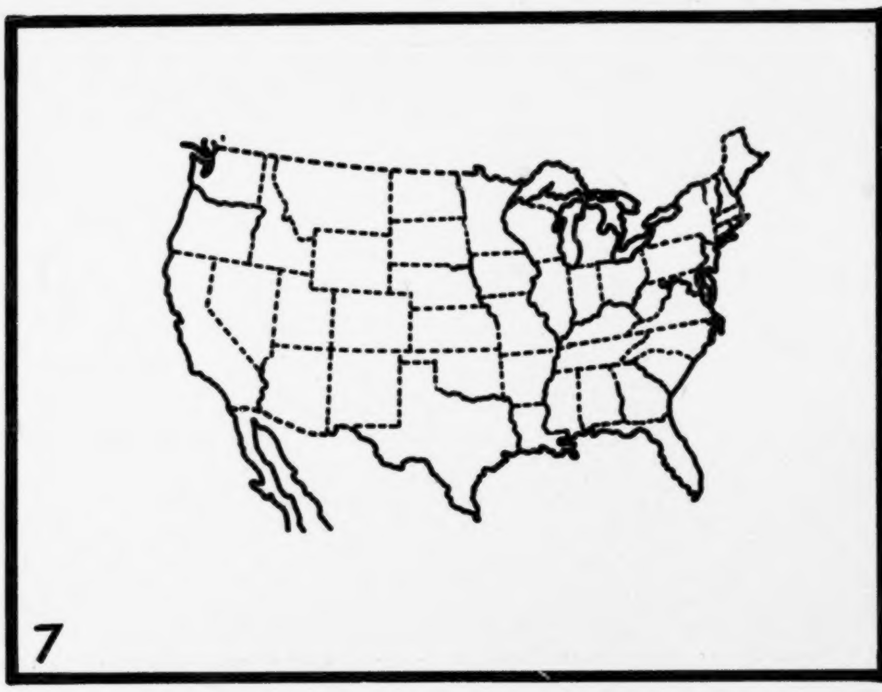

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